NASA SP-7500 (07)

MANAGEMENT

A CONTINUING LITERATURE SURVEY

– With Indexes –

MARCH 1973

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7500 (07)

MANAGEMENT

A CONTINUING LITERATURE SURVEY

– With Indexes –

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Scientific and Technical Information System during 1972.

Scientific and Technical Information Office
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MARCH 1973
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INTRODUCTION

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Management is a compilation of references to selected reports, journal articles, and other documents on the subject of management. This publication lists 389 documents originally announced in the 1972 issues of *Scientific and Technical Aerospace Reports (STAR)* or *International Aerospace Abstracts (IAA)*.

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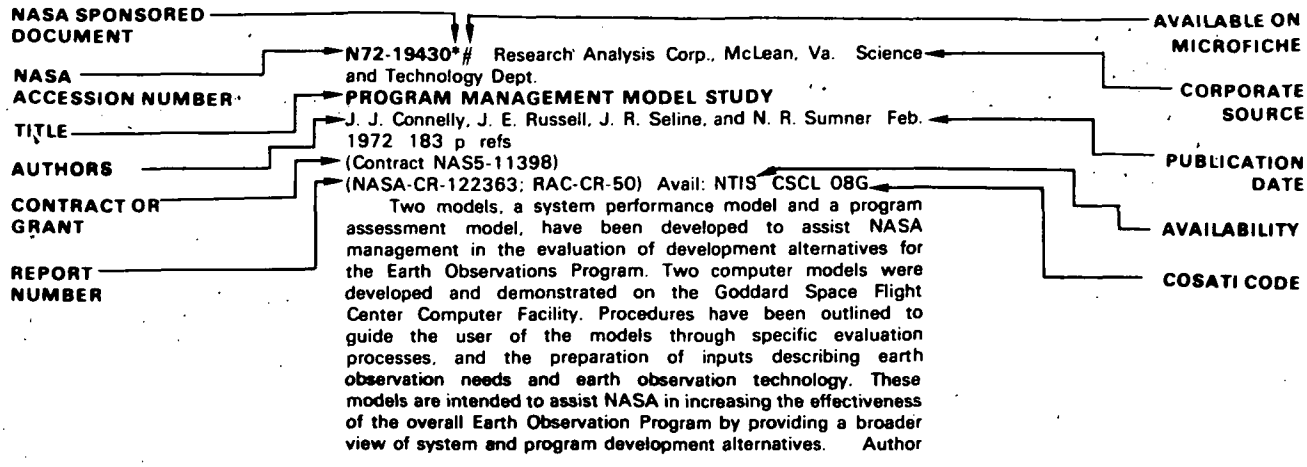

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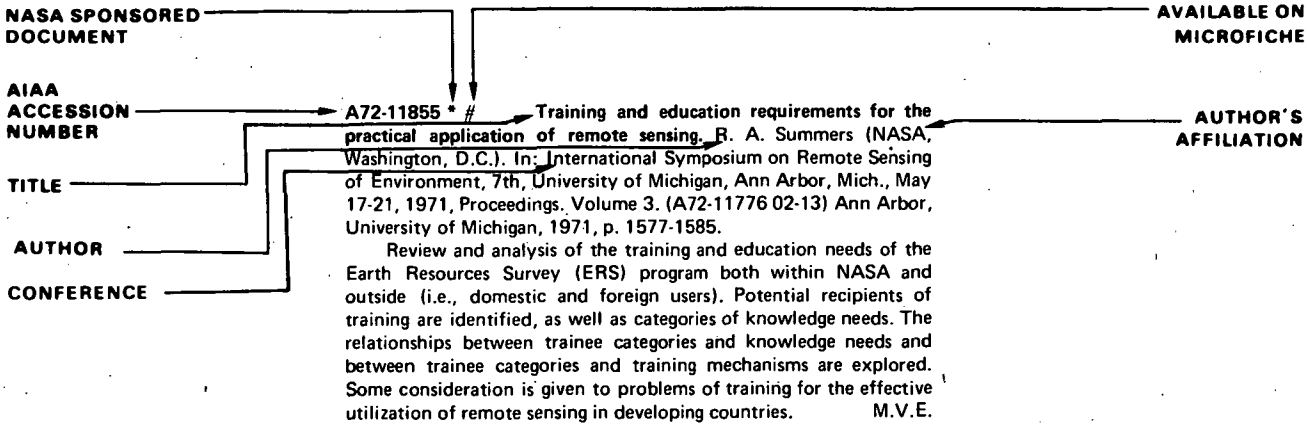

MANAGEMENT

a continuing literature survey

MARCH 1973

IAA ENTRIES

A72-10245 **Producibility considerations in production planning for new aircraft.** S. J. Torget (Boeing Co., Commercial Airplane Group, Renton, Wash.). *Society of Automotive Engineers, National Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Sept. 28-30, 1971, Paper 710746.* 9 p. Members, $1.00; nonmembers, $1.50.

This paper describes some aspects of aircraft producibility at The Boeing Company, and discusses the functions of Design Engineering and Manufacturing organizations in achieving a producible airplane. The makeup and function of the product team prior to Corporate go-ahead, as well as their objectives and timing, are defined. Producibility aspects in both preliminary design and production phases of the aircraft program are identified and described. Specifically, producibility considerations during the preliminary design phase in the provisioning of facilities, subcontracting, and scheduling, as well as production-phase design verification, production planning, subcontractor coordination, materials handling, and plant layout and equipment, are discussed. The effects of design changes on producibility are noted. A discussion of motivation as a factor in producibility is included. (Author)

A72-10246 **Designing for producibility - Design-influenced production cost program.** D. T. Brooks, Jr. (Vought Aeronautics Corp., Dallas, Tex.). *Society of Automotive Engineers, National Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Sept. 28-30, 1971, Paper 710747.* 7 p. Members, $1.00; nonmembers, $1.50.

Discussion of a plan for tracking and controlling end product costs when such costs are influenced by design decisions during the progress of design. Basic in this planning approach is the setting of accurate cost targets at the beginning of design, from previously established base-cost modules, followed by tracking the influence of design decisions vs these targets as the design progresses. A rapid creation of cost targets is the key feature of this planning technique. V.Z.

A72-10249 **The crystal ball focuses on the next generation of transport aircraft.** R. E. Black, D. G. Murphy, and J. A. Stern (Douglas Aircraft Co., Long Beach, Calif.). *Society of Automotive Engineers, National Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Sept. 28-30, 1971, Paper 710750.* 20 p. Members, $1.00; nonmembers, $1.50.

Commercial aircraft market requirements are reviewed and all-cargo, STOL, SST and CTOL aircraft types currently being studied are discussed. It is concluded that after the derivative versions of the present generation of wide-body transports have been introduced into service, the next all-new commercial transport will probably be an advanced technology CTOL. This transport must be quieter than present aircraft. An assessment is made of what technological advances are most likely to be incorporated in this aircraft. Supercritical airfoil technology represents the most promising of the several expected technological advances. It can be applied to either economically increase cruise speeds or to significantly reduce operating costs. There are, in addition, a number of interesting possibilities in structures, propulsion and systems design. The characteristics of medium range aircraft, having cruise Mach numbers of 0.85, 0.92, 0.95, and 0.98, are presented. (Author)

A72-10304 # **Parachute R & D in industry.** D. Gladstone (Irvin Great Britain, Ltd., Letchworth, Herts., England). In: Two-Day Symposium on Parachutes and Related Technologies, London, England, September 15, 16, 1971, Proceedings. London, Royal Aeronautical Society, 1971. 8 p.

Examination of the industrial approach to parachute research and development in the U.K., with particular reference to the management aspects. The task of the research and development department is to generate production work; its activity is divided into the areas of materials and the parachutes themselves. Technical staff requirements are outlined, and the need for close liaison between government and industry is emphasized. F.R.L.

A72-10947 **Organization and management in the CECLES/ELDO European Organization for the Development of Launchers - Organization problems inherent in a multinational development program (Organisation et management dans l'Organisation Européenne pour le Développement des Lanceurs (CECLES/ELDO) - Problemes d'organisation inherents à un programme de développement multinational).** J.-P. Causse (Organisation Européenne pour la Mise au Point et la Construction de Lanceurs d'Engins Spatiaux, Paris, France). In: Astronautical research 1970; International Astronautical Federation, Congress, 21st, Konstanz, West Germany, October 4-10, 1970, Proceedings. Amsterdam, North-Holland Publishing Co., 1971, p. 764-770. In French.

Review of the roles of Great Britain, France, the German Federal Republic, Belgium, Holland, Italy, and Australia in the development of the CECLES/ELDO launchers. The organization was created according to a classical plan consisting of a council of delegates who elected a president among themselves, and an international secretariat comprising both a technical and administrative staff. Aspects of contract placement and financing are discussed. F.R.L.

A72-11156 **Joint venture and international collaboration.** L. G. Evans (Hawker Siddeley Dynamics, Ltd., Hatfield, Herts., England). *Aeronautical Journal,* vol. 75, Oct. 1971, p. 752-758; Discussion, p. 758, 759.

Three different strategies to spread costs by sharing them between two or more partners are discussed as the means of

achieving and controlling cost effectiveness in guided weapon projects. The first, known as Joint Venture, involves the sharing of costs between the government and the industrial company which manages the program. In the second, the work is conducted jointly by collaborating companies in two countries. In the third, development in one country may lead to a sharing of manufacturer between a number of countries. O.H.

A72-11553 Configuration management and quality management - Common goals in uncommon systems. J. Schnipper (Grumman Aerospace Corp., Bethpage, N.Y.). In: American Society for Quality Control, Annual Technical Conference, 25th, Chicago, Ill., May 19-21, 1971, Transactions. Milwaukee, American Society for Quality Control, Inc., 1971, p. 53-60. 13 refs.

The primary objective of configuration management is to assure system readiness in terms of on-time delivery, complete supportability, and maximum effectiveness in fulfilling specific missions. By its interdisciplinary nature, configuration management redefines the functional departments of quality control, engineering, materials, product support, manufacturing, and tooling. Quality control has the unique capability of providing the configuration management activity with the unbiased and validated information required for defining the hardware (and software) delivered to the customer and for formulating management decisions. The functions and some of the methodology employed by quality control in fulfilling these services to project management are described. T.M.

A72-11554 * # NASA's quality program - Achievements and forecast. H. M. Weiss (NASA, Washington, D.C.). In: American Society for Quality Control, Annual Technical Conference, 25th, Chicago, Ill., May 19-21, 1971, Transactions. Milwaukee, American Society for Quality Control, Inc., 1971, p. 71-84. 22 refs.

The NASA quality assurance program during the preceding decade is reviewed, with emphasis on those events and accomplishments which bear on the improvement of quality assurance technology, practice, and management. The nature of the space program is discussed to help understand the significance of past quality assurance events and to anticipate future trends. Potential benefits are revealed which are not necessarily limited to the aerospace field. T.M.

A72-11718 Air traffic control - A problem in decision-making. A. C. Robinson and J. D. Hill (Battelle Columbus Laboratories, Columbus, Ohio). *Battelle Research Outlook*, vol. 3, no. 2, 1971, p. 13-17.

Exposition of the tasks of air traffic control, which must keep thousands of crisscrossing flights untangled. Some 16,000 air traffic controllers man the system, and are distributed between the Air Traffic Control Centers, which control traffic en route, and the terminal areas which control takeoffs, approaches, landings, and terminal-area holding patterns. The way the system works is outlined, various problems are discussed, and future improvements are described. Technological and administrative delays in correcting deficiencies are reviewed. F.R.L.

A72-11721 Air transportation in the American economy. N. Simons, Jr. and R. L. Craig (Battelle Columbus Laboratories, Columbus, Ohio). *Battelle Research Outlook*, vol. 3, no. 2, 1971, p. 26-29.

Attempt, beginning with 1960, to find reliable figures for dissecting civil aviation into its major contributing factors to the American economy, and estimating their worth. The overall contribution is the sum of the sales of aviation services by air carriers, plus the costs of operating business and personal aircraft. In the 1970's, civil aviation can expect benefits from population changes, particularly in age distribution. Three factors in future growth are real disposable income, airline fares, and the time-trend variable. It is suggested that the demand for air transportation will be able to support an annual increase in growth of about 15%. It is pointed out that almost as many people now travel by general aviation as by scheduled airlines. F.R.L.

A72-11728 Social factors in controlling the development of scientific teams. Iu. V. Poshekhonov. (Naukovedenie, prognozirovanie, informatika; Vsesoiuznyi Simpozium, 2nd, Kiev, Ukrainian SSR, December 6-9, 1967, Materialy, p. 166-175.) *Journal of the Astronautical Sciences*, vol. 19, Sept.-Oct. 1971, p. 159-167. 5 refs. Translation.

Experimental sociological investigation of labor organization and control structure in scientific research institutes concerned with the solution of current and expected practical problems for different branches of industry. These scientific teams are concerned with tasks that are intermediate between theoretical research at universities and production and manufacturing in plants. A survey covering a total of 640 persons was made in five institutes working for different branches of industry. The correspondents consisted of 148 management personnel, 156 senior scientists, 97 junior scientists, 169 engineers, and 70 designers. The goal of the survey was to study the social aspects of labor organization and management. The results are discussed in terms of the correspondence between the assigned tasks and the percentage of allotted time actually spent by various personnel in performing these tasks. T.M.

A72-11855 * # Training and education requirements for the practical application of remote sensing. R. A. Summers (NASA, Washington, D.C.). In: International Symposium on Remote Sensing of Environment, 7th, University of Michigan, Ann Arbor, Mich., May 17-21, 1971, Proceedings. Volume 3. Ann Arbor, University of Michigan, 1971, p. 1577-1585.

Review and analysis of the training and education needs of the Earth Resources Survey (ERS) program both within NASA and outside (i.e., domestic and foreign users). Potential recipients of training are identified, as well as categories of knowledge needs. The relationships between trainee categories and knowledge needs and between trainee categories and training mechanisms are explored. Some consideration is given to problems of training for the effective utilization of remote sensing in developing countries. M.V.E.

A72-12035 # The ESTEC project control system. H. Gehriger (ESRO, European Space Research and Technology Centre, Noordwijk, Netherlands). *ESRO/ELDO Bulletin*, Oct. 1971, p. 22-32.

Description of the ways by which the individual techniques of critical path network analysis, work package cost control, and phased project planning have been integrated into a comprehensive project control system and successfully implemented and applied to various satellite projects at the European Space Research and Technology Centre. The principal advantages of the system described are that it forces all project participants to develop their ideas and plans in close cooperation at a very early stage, and that unfavorable trends can be detected and located in their embryonic stages when there is still time to initiate corrective action with a high chance of success. F.R.L.

A72-12377 The microwave landing system development program. J. W. Edwards (FAA, Washington, D.C.). In: EASCON '71; Electronics and Aerospace Systems Convention, Washington, D.C., October 6-8, 1971, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1971, p. 17-21.

A summary is presented of the activities required over a five year time period for the development of a microwave landing system. The broad range of user operational requirements this system must satisfy has been tentatively established by Special Committee 117 of the Radio Technical Commission for Aeronautics. M.V.E.

A72-12695 **Estimating research payoff by internal rate of return method.** R. N. Foster (Abt Associates, Cambridge, Mass.). *Research Management,* vol. 14, Nov. 1971, p. 27-43.

Description of a method for calculating a return on research figure which is comparable to the normal internal rate of return criteria presently used by numerous large corporations for project evaluation. A mathematical model is developed as a basis for these calculations. The model is applied to some typical industrial data of the Department of Commerce for the period from 1960 through 1969, covering food, chemical, textile and paper industries, and IBM. Curves are also plotted to show the relationship between product life and return on research for selected companies on the basis of this model. V.Z.

A72-13636 # **METROMEX - An investigation of inadvertent weather modification.** S. A. Changnon, Jr., F. A. Huff, and R. G. Semonin (Illinois State Water Survey, Urbana, Ill.). *American Meteorological Society, Bulletin,* vol. 52, Oct. 1971, p. 958-967. 19 refs. NSF Grant No. GA-18781.

Description of the background and basis of METROMEX, a field project designed to investigate inadvertent weather modification by urban-industrial effects and man-made changes in precipitation. The organizational aspects of the program and the activities of the four research groups implementing it are reviewed. The program background includes a survey of urban-related weather modification and precipitation changes illustrated by specific examples. The organizational aspects of the program include the research plans, the physical organization, and the program management. The goals of each research group are described. M.V.E.

A72-14199 **System management.** M. Beckenstein (Boeing Co., Houston, Tex.). In: Institute of Electrical and Electronics Engineers, Southwestern Annual Conference and Exhibition, 23rd, Houston, Tex., April 28-30, 1971, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1971, p. 354-356.

Description of an analysis technique which precludes equipment performance and data problems and provides a medium for effective program management. To demonstrate how this technique provides thorough consideration of all program objectives, data management is considered as a unique system element relative to its influence on the definition of operational equipment and procedures. This includes the assumption of scientific data objectives, as initiated by a Principle Investigator (PI). The analysis technique, as originally developed and subsequently refined, is intended for extremely complex systems. It is recommended that the procedures of AFSCM 375-5 or equivalent (AFBSD 62-62) be adapted to the individual needs of each program. M.M.

A72-14204 **Configuration management on small production contracts for the U.S. Government.** V. M. Fancher (Boeing Co., Houston, Tex.). In: Institute of Electrical and Electronics Engineers, Southwestern Annual Conference and Exhibition, 23rd, Houston, Tex., April 28-30, 1971, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1971, p. 456-460. 9 refs.

It is essential that any contractor, desiring to win contracts for supplying complex operational equipment to the U.S. Government, have an adequate in-house configuration management system. This paper describes the minimum configuration management necessary to comply with U.S. Government requirements on very limited quantity design and production contracts. Many of these techniques of configuration management can also be utilized by manufacturers of commercial equipment to more effectively manage the configuration of their commercial products with resultant improvements in quality, cost control, production efficiency, service to the customer, and management visibility. Configuration management may be defined as a system of configuration identification, control, and accounting for all system equipment and components thereof. The basic ingredients can be summed up as: (1) configuration identification - complete definition of what the product should be, (2) configuration control - making sure that you really know what the product will be, and (3) configuration accounting - audits and documentation to prove what the product really is. (Author)

A72-15224 # **Organizing for support of the product.** E. Dalva (Grumman Aerospace Corp., Bethpage, N.Y.). *Logistics Spectrum,* vol. 5, Winter 1971, p. 2-8.

Discussion of the organization of the Grumman Product Support Department as a vital ingredient of the functional structure of the company. The department is described as a body of 2700 employees which handles support system engineering and analysis, support equipment and trainer design engineering, and technical proposals for future support projects. It also covers Technical Publications, Customer Training, Supply Operations, Field Service and Operations Support. The importance of a sound organization of these functions for a smooth and efficient functioning of the company as a whole is stressed. V.Z.

A72-15225 # **Method for relating multiple performance parameters to a single incentive uniquely.** B. Ostrofsky and E. G. Triner (Houston, University, Houston, Tex.). *Logistics Spectrum,* vol. 5, Winter 1971, p. 25-31, 40. 7 refs.

A method is described for relating a single performance parameter to a value (pay-off) scale. Using this development, the method is extended to the multiple incentive case and procedures presented for relating multiple performance areas to a single incentive scale in such a manner that resulting joint performance of the product or system being developed leads to one and only one incentive award. Hence total systems performance (as defined contractually) and incentive award are related uniquely. Assumptions and limitations are presented. (Author)

A72-15455 * **The relationship between certain characteristics of industrial research proposals and their subsequent disposition.** N. R. Baker (Georgia Institute of Technology, Atlanta, Ga.); J. Siegman (Nebraska, University, Lincoln, Neb.), and J. Larson. *IEEE Transactions on Engineering Management,* vol. EM-18, Nov. 1971, p. 118-124. 12 refs. NSF-supported research; Grant No. NsG-495.

The ideas produced by three idea generation groups operating within a large industrial R & D laboratory were studied over a period of two years. Data were collected in order to relate idea dispositions by management to subjective evaluations provided by respondents representing the technical staff and to study the roles of urgency, predictability, and expected time horizon in the disposition decision. The findings are (1) a significant positive correlation was found between idea dispositions and associated subjective evaluations despite the fact that management did not know the subjective evaluations at the time the disposition decisions were made; (2) urgency was the dominant consideration in the disposition decisions, but predictability and expected time horizon were dominant in the subjective evaluations; (3) predictability and time horizon are covariants; and (4) management hedges by shelving marginal ideas. Implications for R & D management are drawn. (Author)

A72-15456 **The DELTA chart - A method for R & D project portrayal.** J. N. Warfield and J. D. Hill (Battelle Columbus Laboratories, Columbus, Ohio). *IEEE Transactions on Engineering Management,* vol. EM-18, Nov. 1971, p. 132-139. 8 refs.

Flow charts and network methods are vital tools used to facilitate clear concise planning and scheduling of large projects. The limited flexibility and vocabulary of existing tools do not allow the flexibility required for planning and depicting research and development (R & D) projects. DELTA charts described in this paper have

been designed to incorporate not only events and activities but also decision and logic functions that enable representation of alternative approaches and feedback paths, both of which are essential in R & D project planning. A precise syntax for the DELTA chart components is defined in order to make them capable of presenting a clear precise picture that is self-explanatory to a wide audience. Two examples of DELTA charts are presented, the first of which is a DELTA chart that indicates the procedure for making a DELTA chart. (Author)

A72-16698 **The financing of airports.** K. von Laun. *Airport Forum,* Dec. 1971; p. 71-74, 76-82, 84. In English and German.

Consideration of some of the major problems arising in the field of airport financing which differ in special features from the financing of other business ventures. The creation of a new major airport requires an amount of money in the order of DM 1500 million. It is considered that airports can pass through different stages of development as far as their revenue-earning ability is concerned. Airports which provide, or are obliged to provide, facilities whose capacity is initially too great will live through low-revenue periods. However, it will usually follow that, as traffic increases and the facilities are more fully utilized, and as the interest burden is reduced, the revenue picture will improve. F.R.L.

A72-16778 # **The economic control system of Interflug (Das ökonomische Kontrollsystem der Interflug).** H. Uhrig (Gesellschaft für Internationalen Flugverkehr mbH, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 7, no. 11, 1971, p. 485-501. In German.

The internal economic control system has the objective to ensure the most profitable use of the material and financial assets of Interflug with regard to the entire national economy. The control system has to uncover weaknesses and to eliminate them. A second objective is to point out good results and methods. The areas subject to internal control include the plan concerning the operational objectives, costs, labor, science and technology, material, and prices. Means and methods of internal economic control are discussed. G.R.

A72-17333 # **Control concept alternatives of the fourth generation ATC system.** D. E. Findley (U.S. Department of Transportation, Washington, D.C.). In: Radio Technical Commission for Aeronautics, Annual Assembly Meeting, Washington, D.C., November 17, 18, 1971, Proceedings.
Washington, D.C., Radio Technical Commission for Aeronautics, 1971. 7 p.

The fourth-generation control concept discussed is understood to mean that part of a total system concept which addresses the airspace structure, the management concept for the airspace structure and its elements, and the rules and procedures for the use and operation in the airspace. Airspace structure includes the categories into which the overall airspace is to be divided, along with a specification of the geographic and jurisdictional boundaries of these airspace categories. Three different control concepts currently under consideration are examined. V.P.

A72-17396 * **What motivates researchers in times of economic uncertainty.** G. C. Bucher (NASA, Marshall Space Flight Center; Alabama, University, Huntsville, Ala.) and J. E. Reece (U.S. Army, Safeguard Systems Command, Huntsville, Ala.). *Research Management,* vol. 15, Jan. 1972, p. 19-32. 7 refs.

Results of a study initiated late in 1970 to obtain both a measure of on-and-around-the-job factors which were 'motivating' to engineers and scientists, and to obtain an indication of how the relative importance of these factors changes as a result of the uncertain economic environment. A questionnaire, 'The Jackman Job Satisfaction Schedule,' was used to satisfy the needs of the study. It is concluded that managers can enhance the feeling of motivation by making individual job assignments interesting and challenging, by formulating significant milestones and end points into job content, and by assigning ample rewards with corresponding responsibility. In times of economic uncertainty increased emphasis should be given to security-related aspects of employment. F.R.L.

A72-17397 **What wins R & D contracts - Price or quality.** W. D. Putt (Holograph Corp., Cambridge, Mass.). *Research Management,* vol. 15, Jan. 1972, p. 47-56. Research supported by the Ford Foundation.

Discussion of some recent research into government applied-research proposal competitions, with examination of four fundamental questions. The effectiveness of cost strategies and price strategies in winning proposal competitions is studied, as well as the questions of whether the prices are higher for proposals of high technical quality than for proposals of low quality, and whether price or technical quality plays a greater role in winning government R & D proposal competitions. It is considered to be more important to emphasize the technical aspects of the proposal over the cost-related aspects. However, to properly assess the technical quality of a proposal, it is critically important to know the level of technical excellence that the competition will offer. F.R.L.

A72-17978 * # **Application of the GERTS II simulator in the industrial environment.** G. E. Whitehouse and K. I. Klein (Lehigh University, Bethlehem, Pa.). In: Conference on Applications of Simulation, 4th, New York, N.Y., December 9-11, 1970, Proceedings. New York, Association for Computing Machinery, 1971, p. 170-177. 13 refs. Contract No. NAS12-2079.

GERT was originally developed to aid in the analysis of stochastic networks. GERT can be used to graphically model and analyze complex systems. Recently a simulator model, GERTS II, has been developed to solve GERT Networks. The simulator language used in the development of this model was GASP II A. This paper discusses the possible application of GERTS II to model and analyze (1) assembly line operations, (2) project management networks, (3) conveyor systems and (4) inventory systems. Finally, an actual application dealing with a job shop loading problem is presented. (Author)

A72-18067 **Models for project management.** W. B. Crowston (MIT, Cambridge, Mass.). *Sloan Management Review,* vol. 12, Spring 1971, p. 25-42. 11 refs.

Survey of project management models currently available, with discussion of solution techniques. The dimensions of primary interest are time and cost. The survey begins with the simple time-oriented network model that calculates minimum project length. It is then assumed that each task requires a known amount of a limited resource, and the effect of this on project length is examined. Time-cost tradeoff models are discussed. It is shown that these models are useful not only for decision-making, but also for specifying what information should be collected for the decision maker and for placing a value on that information. F.R.L.

A72-18169 **Intelsat - New points of view regarding the structure of international organizations (Intelsat - Neue Gesichtspunkte für die Struktur internationaler Organisationen).** C. Patermann. *Zeitschrift für Luftrecht und Weltraumrechtsfragen,* vol. 21, Jan. 1, 1972, p. 10-20. 50 refs. In German.

Discussion of a recently concluded international agreement regarding the formation of a single worldwide satellite communications system. The recently concluded Intelsat agreement is shown to consist of a governmental agreement and an operational agreement. The changes made in the legal stature of Intelsat in comparison with the earlier (1964) agreement are noted, in particular, the change from an unincorporated joint venture into a public international organization. The proposed new organization of Intelsat is described, noting the clear separation between political and commercial activity. The question of the legal representation of Intelsat in disputes is considered, as well as the problem of financing. A.B.K.

A72-18435 **The use of cost data during aircraft design.** P. H. Cosier (British Aircraft Corp., Ltd., Bournemouth, Hants., England). In: International Symposium on Information Systems for Designers, University of Southampton, Southampton, England, July 6, 7, 1971, Proceedings. Southampton, University of Southampton, 1971, p. 12-1 to 12-13.

Data resulting from the application of value engineering studies to aircraft in production are discussed and analyzed. Several examples are presented which show that considerable cost savings and other benefits are gained at the detail design stage if there are meaningful cost targets. Rules for cutting costs during design are proposed which lead not only to lower costs but also to a better product which is more profitable for the manufacturer, the user, and the nation. O.H.

A72-18612 # **Space Shuttle - The common denominator.** I. Rattinger (General Dynamics Corp., Convair Div., San Diego, Calif.). In: Space for mankind's benefit; Proceedings of the First International Space Congress, Huntsville, Ala., November 15-19, 1971. Preliminary Volume. Huntsville, Ala., Huntsville Association of Technical Societies, 1971, p. 3-1 to 3-25.

Evaluation of the Space Shuttle Program in terms of its benefits to national economy. It is expected that the program will stimulate about 20 billion in domestic production, will provide over 400,000 manyears of employment in the arospace industry and more than 280,000 manyears of nonaerospace support-program employment, will benefit the U.S. balance of trade, and will require less import than would a residential housing construction program or an increase in consumer spending of comparable size. The program will also satisfy national space transportation requirements at reduced costs and permit additional savings in payload development and operation costs. V.Z.

A72-18831 # **Safely introducing new aircraft into airline service as seen by government.** J. E. Dougherty (FAA, Washington, D.C.). In: Annual International Air Safety Seminar, 24th, Mexico City, Mexico, October 18-21, 1971, Technical Summary. Arlington, Va., Flight Safety Foundation, Inc., 1971, p. 48-62. 13 refs.

The government's role in the introduction of widebody aircraft to air-carrier service is considered. The Federal Aviation Act empowers the Administrator to prescribe minimum standards governing, in the interest of safety, the design, materials, workmanship, construction, performance and inspection and overhaul of aircraft and related components. The Federal Aviation Act also empowers the Administrator to find that a particular aircraft design and related components meet the applicable minimum airworthiness standards. Factors of modern maintenance program development are discussed together with in-service aspects, the relationship of maintainability to design, and fail-safe structural configurations. Also considered are questions of accessibility, inspectability, serviceability, replaceability, redundancy of systems, and environmental quality. G.R.

A72-18974 * **Government and technological innovation - Weather modification as a case in point.** W. H. Lambright (Syracuse University, Syracuse, N.Y.). *Public Administration Review*, vol. 32, Jan.-Feb. 1972, p. 1-10. 22 refs. Research supported by the Inter-University Case Program and NASA.

The principal technology on which all forms of intentional, local weather modification ultimately rest is that of cloud seeding. There are three primary milestones in the evolution of such a new technology including invention, development, and introduction to society on an operational basis. It is shown that government has been deeply involved in each of the first two phases of weather modification's evolution. The agencies involved include the military agencies, the Weather Bureau, the National Science Foundation, and the Bureau of Reclamation. It is pointed out that weather modification will require some unusually flexible and open administrative devices if it is to advance in the public interest. G.R.

A72-19126 * **Quality - Inexpensive if a way of life.** D. Grau (NASA, Marshall Space Flight Center, Huntsville, Ala.). *Quality Progress*, vol. 5, Feb. 1972, p. 20, 21.

NASA major projects require phased planning. The participation of persons charged with maintaining the proper quality during the last two of four phases has become accepted practice. Current objectives are concerned with the application of quality assurance techniques during the second phase. It is pointed out that quality must be emphasized during the entire engineering process, starting with the selection of the components. G.R.

A72-19551 **Methods of evaluating R & D organizations.** E. M. Glass (U.S. Department of Defense, Washington, D.C.). *IEEE Transactions on Engineering Management*, vol. EM-19, Feb. 1972, p. 2-12. 16 refs.

Summary of a number of techniques used by the Department of Defense in evaluating the effectiveness of its in-house laboratory systems. The intent of the study is to stimulate interest and discussion in this area of increasing importance. The distribution of the Defense research, development, test, and evaluation (RDT & E) budget has four aspects: mission objective, category of R & D activity, by military department, and by performer. In examining R & D laboratories, many different types of appraisal have been used: supervisory evaluation, program evaluation, special appraisal, visiting committees, and the natural competition of laboratories for important programs. Some of the techniques that have been employed are discussed. F.R.L.

A72-19552 **A method for evaluation of subsystem alternate designs.** P. G. Goodwin (RCA, Astro-Electronics Div., Princeton, N.J.). *IEEE Transactions on Engineering Management*, vol. EM-19, Feb. 1972, p. 12-21. 6 refs.

Development and successful use of a method for considering, individually, the various aspects for evaluating design alternates and for combining these considerations in a systematic way. The method was implemented by an algorithm consisting of three principal functions, minimally coupled to each other. One of the principal functions operates on the trade criteria, and another operates on the preliminary design of the alternates proposed for evaluation. The third function relates to the evaluation of the alternate candidates, using the results of the other two functions as input data. F.R.L.

A72-19553 **R & D managers' choices of development policies in simulated R & D environments.** H. Moskowitz (Purdue University, Lafayette, Ind.). *IEEE Transactions on Engineering Management*, vol. EM-19, Feb. 1972, p. 22-30. 29 refs.

Description of the results of some experiments based on an R & D game that examined R & D managers' proclivities for various options that hedge against uncertainty and the overall quality of their choices with respect to the Bayesian decision-theoretic model. R & D managers exhibited a higher proclivity for parallel approaches in information acquisition, but a lower propensity for parallel approaches in terminal actions with respect to the Bayesian norm. Subjects also preferred simultaneous (parallel) to sequential information acquisition, although the latter was preferable. Subjects' choices, which generally conformed to the principles and practices found in the R & D literature, led to substantially suboptimal behavior as compared to the Bayesian decision-theoretic norm. This strongly suggests the need to introduce decision theory into R & D management practice through industrial training programs. F.R.L.

A72-19722 **Some fundamental properties of multivariable systems and the use of these properties in optimization.** M. V. Meerov (Institute of Control Sciences, Moscow, USSR). In: Multivariable technical control systems; Proceedings of the Second Symposium, Düsseldorf, West Germany, October 11-13, 1971. Volume 2. Amsterdam, North-Holland Publish-

ing Co., 1971, p. 4.2 1-4.2 13.

The optimization problem for a multivariable plant is formulated. The generalized quality criterion of the plant operation depends simultaneously on all output parameters. A number of examples are considered including the optimization of oilfield operation, the optimal power load of n pairs of transceivers, plants described by Laplace and Poisson equations, and a problem involving the achievement of interindustrial balance. An algorithm is discussed for solving problems presented in a certain matrix formulation, and the characteristics of such problems are examined. G.R.

A72-20268 **Examples of technological trend forecasting for research and development planning.** J. Martino (USAF, Office of Research Analyses, Holloman AFB, N. Mex.). *Technological Forecasting and Social Change,* vol. 2, no. 3-4, 1971, p. 247-260.

The research reported here was directed at evaluating existing means of technological forecasting and obtaining improved methods. This report presents the results of fitting appropriate trend curves to several sets of data on technologies of interest to the Air Force. These trends, when projected, represent technological forecasts. The likelihood of continuation or change of the trend is discussed in each case, with implications of R & D (research and development) planning. These forecasts are considered of possible interests as examples of applied forecasting techniques. (Author)

A72-20270 **Technological advances and program risks.** J. F. Duvivier (Boeing Co., Vertol Div., Philadelphia, Pa.). *(Military Operations Research Society, Annual Symposium, 25th, New London, Conn., June 1970.) Technological Forecasting and Social Change,* vol. 2, no. 3-4, 1971, p. 277-287. 6 refs.

Discussion of the application of operations research and systems analysis techniques to situations involving decisions in the face of uncertainty, such as may be encountered in weapons programs threatened with cost overruns or schedule slippages. Several techniques under development designed to relate advances in technology and program risks are reviewed. It is felt that major efforts are required for the development of more reliable R & D cost-estimating methods, and for solving problems of technology evaluation. The development of more reliable predictive methods will enable program managers to set realistic goals and deadlines and to meet schedules. M.V.E.

A72-20271 **Technology transfer model.** S. N. Bar-Zakay (RAND Corp., Santa Monica, Calif.). *Technological Forecasting and Social Change,* vol. 2, no. 3-4, 1971, p. 321-337. 72 refs.

A model of technology transfer is presented, with a variety of suggested activities to be undertaken in a specified sequence by individuals and organizations intending to engage in a technology transfer project. Technology transfer is defined as the process that takes place when scientific or technological information generated and/or used in one context is reevaluated and/or implemented in a different context. Technological forecasting has been defined as the probabilistic assessment of the feasibility of future technology transfer, and the presented model is intended to serve as a 'check list' for performing such an assessment by listing the elements involved in the process. Topics are pointed out in which present knowledge is limited and more research is required. M.V.E.

A72-20671 **Initial and continuing responsibilities of general aviation manufacturers.** L. S. Carsey. *(Symposium on General Aviation Law, Southern Methodist University, Dallas, Tex., Mar. 17-19, 1971.) Journal of Air Law and Commerce,* vol. 37, Summer 1971, p. 295-307. 97 refs.

The relevant regulations and statutes which delineate the initial and continuing responsibilities of aviation manufacturers are examined together with the common-law sources of liability and the role of regulations in establishing limits of liability. Topics examined include the implementation of safety regulations, airworthiness directives, maintenance manuals, reporting obligations, component assembly, modifications and improvements, inspection requirements, and evidence of negligence. T.M.

A72-20675 **Notes on the history of federal regulation of airline mergers.** L. S. Keyes. *Journal of Air Law and Commerce,* vol. 37, Summer 1971, p. 357-387. 120 refs.

Past experience in the regulation of airline mergers in the U.S. is surveyed, and certain improvements in the current procedures for evaluating merger proposals are recommended. There has been a tendency on the part of regulators to favor, and on occasion to promote, mergers for inappropriate purposes - i.e., as a remedy for temporary financial reverses unrelated to the structure of the industry. An additional defect in existing procedures stems from attempts at judging the effects of each merger on a case-by-case basis. Possible alternatives which would alleviate the resulting problems are examined in terms of their effects on the existing regulatory framework. T.M.

A72-21468 # **An application of linear programming to contingency planning - A tactical airlift system analysis.** D. C. Dellinger (Duke University, Durham, N.C.). *Naval Research Logistics Quarterly,* vol. 18, Sept. 1971, p. 357-378.

Application of linear programming to the selection of aircraft for a tactical airlift fleet which provides mobility within a contingency area. The elements in the system are the different types of candidate aircraft, and the problem is to decide on the number of each type to include in the tactical airlift fleet. The desired capability and flexibility of the entire system is specified, and an entire system which meets the specification is sought as a solution to the problem. The model is a standard linear program, consisting of an objective function to be minimized and a set of constraint equations (or inequalities). The unusual feature of the model is that it permits an explicit specification of the flexibility to be possessed by the fleet. This is accomplished by specifying a number of mission sets, each of which must be within the capability of any fleet in the set of feasible fleets. T.M.

A72-21470 # **Dynamic programming approach to the optimization of Naval aircraft rework and replacement policies.** A. N. Schwartz, J. A. Sheler (Rochester, University, Rochester, N.Y.), and C. R. Cooper (U.S. Naval Air Systems Command, Washington, D.C.). *Naval Research Logistics Quarterly,* vol. 18, Sept. 1971, p. 395-414. 9 refs. Contract No. N0014-14-68-A-0091.

This paper describes a method for determining optimal repair and replacement policies for aircraft, with specific reference to the F-4. The objective of the analysis is to choose the set of policies from all possible alternatives over a finite planning horizon which minimizes the cost of operations. A dynamic program is presented which seeks an optimal path through a series of decision periods, when each period begins with the choice of keeping an aircraft, reworking it before further operation, or buying a new one. We do not consider changes in technology. Therefore, when a replacement does occur, it is made with a similar aircraft. Multivariable statistical techniques are used to estimate the relevant costs as a function of age, and time since last rework. (Author)

A72-21587 **Graphical analysis of accelerated life test data with the inverse power law model.** W. Nelson (GE Information Sciences Laboratory, Schenectady, N.Y.). *IEEE Transactions on Reliability,* vol. R-21, Feb. 1972, p. 2-11. 25 refs.

In this paper, graphical methods are presented for analyzing accelerated life test data with the inverse power law model, when all test units are run to failure. The inverse power law model is described, and graphical methods for estimating its parameters from

such complete data are given. These methods are illustrated with accelerated test data on time to breakdown of an insulating fluid. While the methods are presented with the inverse power law model, they can be used for analyzing many other accelerated life test situations. These methods are presented so that they can be used by individuals with a limited statistical background. (Author)

A72-22149 # **Introduction of automated systems for control of an enterprise and the organizational and technical preparation of enterprises for the introduction (Organizatsionno-tekhnicheskaia podgotovka predpriiatii k vnedreniiu i vnedrenie avtomatizirovannykh sistem upravleniia predpriiatiem).** N. I. Kiriliuk and A. G. Sirchenko. In: Organizational principles and technological arrangement of automated systems of control of industrial plants. Kiev, Izdatel'stvo Naukova Dumka, 1971, p. 109-119. In Russian.

Analysis of ways and means of preparing industrial enterprises for the introduction of computerized administrative control systems. A proposed schedule of introductory operations consists of four phases encompassing (1) preliminary planning of system structure on the basis of analyzed goals and defined resources, (2) development of a technical project that defines equipment requirements and identifies changes in the present system, (3) practical design and allocation of data handling equipment with gradual utilization of its capabilities, and (4) final realization and refinement of the overall system. Practical recommendations are given for systems planners and management personnel at each phase of the conversion schedule. T.M.

A72-22237 **Fair profits from defense business.** L. H. Goodhue (Logistics Management Institute, Washington, D.C.). *Harvard Business Review,* vol. 50, Mar.-Apr. 1972, p. 97-107.

The Department of Defense intends to introduce criteria regarding the return on investment as a factor in negotiating profits on defense contracts. Up to now, the government's negotiating targets have been based on a percentage of expected costs. The intended change has prompted considerable controversy. Procurement problems are discussed together with the use of weighted guidelines (WGL), limitations of WGL policy, details of a proposed solution, and aspects of the allocation of capital. G.R.

A72-22950 **A forecasting method for setting short-range research objectives.** K. Shilliff (Akron, University, Akron, Ohio) and R. D. Smith (Kent State University, Kent, Ohio). *Research Management,* vol. 15, Mar. 1972, p. 24-34. 10 refs.

An approach to technological forecasting is advocated that lays greater stress on the organizational elements of engineering, production, and marketing. It is contended that current forecasting methodology is not systems oriented, and the proposed approach is intended to correct this shortcoming. M.V.E.

A72-23138 **Attitudes of air traffic controllers at Frankfurt Airport towards work and the working environment.** R. Singer and J. Rutenfranz (Giessen, Universität, Giessen, West Germany). *(Stress in Air Traffic Control Research Association, International Symposium on Objective Assessment of Work Load in Air Traffic Control Tasks, Technische Universität Darmstadt, Darmstadt, West Germany, June 1971.) Ergonomics,* vol. 14, Sept. 1971, p. 633-639.

As part of an opinion survey among air traffic controllers at Frankfurt Airport questions were asked as to attitudes towards work and working conditions. A relatively high percentage of the controllers in question declared that they were satisfied with their job, but at the same time relatively high dissatisfaction could be recognized regarding important factors such as administration, pay and working conditions. The possible cause of this discrepancy is discussed. (Author)

A72-23846 **The International Air Transport Association - A case study of a quasi-governmental organization.** R. Y. Chuang. Leiden, A. W. Sijthoff International Publishing Co., 1972. 200 p. 514 refs. $10.85.

The background of international aviation before 1944 is discussed together with the results of the Chicago Conference, 1944, details regarding the Bermuda Agreement of 1946, and provisions concerning rates and IATA in other international bilateral air transport agreements. Organization and functions of IATA in general are considered along with the traffic conference machinery, the outputs of the conferences and government reservations, the enforcement of IATA traffic conference resolutions, the economics of air transportation, and the legal nature of public corporations and mixed enterprises. G.R.

A72-23851 # **Maintainability - An effective engineering discipline.** H. M. Sohn (Lockheed-Georgia Co., Marietta, Ga.). *Logistics Spectrum,* vol. 6, Spring 1972, p. 11-17.

Review of the general success prerequisites of a maintainability program, description of the maintainability characteristics of the C-5A Galaxy aircraft, and discussion of some of the problems encountered and resolved during the C-5A program. Real and purposeful maintainability features of any system or component are shown to be numerous and seemingly insignificant: like locating a part a little differently to improve access to its attaching fasteners, or making an access panel large enough not only to get both hands through it, but also to be able to see what is being done. There is little glamour connected with incorporating these small features into an end item. It takes a well established and properly managed maintainability program to let slip none of these features. M.V.E.

A72-23852 # **Maintainability engineering as it relates to system engineering and logistics support.** B. S. Blanchard (Virginia Polytechnic Institute and State University, Blacksburg, Va.). *Logistics Spectrum,* vol. 6, Spring 1972, p. 18-26. 8 refs.

The principles and practices of maintainability are reviewed using a task-oriented approach in lieu of the more conventional organizational approach. Specific topics covered include: basic terms and definitions, maintainability tasks required in the system design and development process, the relationship of these tasks with systems engineering and logistics support requirements. M.V.E.

A72-23993 **Decision theory and cost modeling.** W. T. Weir (General Electric Co., Philadelphia, Pa.). In: Annual Reliability and Maintainability Symposium, San Francisco, Calif., January 25-27, 1972, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1972, p. 319-328. 8 refs.

This paper discusses decision theory in the broad sense indicating some of the real problems encountered in tackling the total system problem. Two examples are presented to illustrate the manner in which more meaningful and cost effective decisions can be made on a development program. The concept of the Integrated Test Program for development programs and its role in the decision making process are then introduced along with an example which makes use of all test data available on a program and cost-benefit modeling which optimizes the allocation of the additional testing required for demonstration of reliability. (Author)

A72-24004 **Growth curves - A practical management tool.** F. J. Kreuze (Xerox Corp., Rochester, N.Y.). In: Annual Reliability and Maintainability Symposium, San Francisco, Calif., January 25-27, 1972, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1972, p. 430-436.

Technical management needs a means of rapidly assessing the past record of a new product in regard to reliability achievement. An even more pressing need is to use these data to forecast future

expected reliability and to plan the proper application of available resources to economically meet reliability goals. How reliability growth curve methodology meets this need and details of the technique itself are covered. (Author)

A72-24005 * Design review - A tool for all seasons. D. S. Liberman (NASA, Reliability and Quality Assurance Office, Washington, D.C.). In: Annual Reliability and Maintainability Symposium, San Francisco, Calif., January 25-27, 1972, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1972, p. 437-445. 6 refs.

The origins of design review are considered together with questions of definitions. The main characteristics which distinguish the concept of design review discussed from the basic master-apprentice relationship include competence, objectivity, formality, and a systematic approach. Preliminary, major, and final reviews are the steps used in the management of the design and development process in each company. It is shown that the design review is generically a systems engineering milestone review with certain unique characteristics. G.R.

A72-24006 Application of decision-making models. E. R. Levitt (Westinghouse Defense and Space Center, Baltimore, Md.). In: Annual Reliability and Maintainability Symposium, San Francisco, Calif., January 25-27, 1972, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1972, p. 446-457. 7 refs.

This paper addresses the application and interfaces of reliability-based decision-making models, including system configuration, reliability, optimum repair level, spares optimization, and availability analysis. These models provide a means to rapidly quantify a variety of decision options in each of these areas. The successful application of these models, like a box of carpenter's tools, depends on an understanding of what can be done with each tool and the human interface and role in using the tools. This paper presents a general description of what each model does, how it works, and the prerequisite data necessary for useful and valid results. (Author)

A72-24007 * NASA program decisions using reliability analysis. A. Steinberg (NASA, Marshall Space Flight Center, Engine Program Office, Huntsville, Ala.). In: Annual Reliability and Maintainability Symposium, San Francisco, Calif., January 25-27, 1972, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1972, p. 458-464. 5 refs.

NASA made use of the analytical outputs of reliability people to make management decisions on the Apollo program. Such decisions affected the amount of the incentive fees, how much acceptance testing was necessary, how to optimize development testing, whether to approve engineering changes, and certification of flight readiness. Examples of such analysis are discussed and related to programmatic decisions. (Author)

A72-24021 Reliability and ESP. J. L. Maybell (McDonnell Douglas Astronautics Co., Huntington Beach, Calif.). In: Annual Reliability and Maintainability Symposium, San Francisco, Calif., January 25-27, 1972, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1972, p. 594-598. 11 refs.

Extrasensory perception may someday be employed as a System Reliability improvement technique. Consistently accurate identification and prevention of failures, before they occur, is a reliability goal we all seek. Many of today's assurance technology tasks are oriented toward this goal. Until extrasensory perception is further perfected, an Experience Storage Program (ESP) may be employed as a real contribution to the goal. The purpose of this paper is to describe a program for the retention and efficient dissemination of previous design experience to prevent design problem repetition. (Author)

A72-24026 Statistical-analytical cost models for the development and fabrication of spacecraft. II (Statistisch-analytische Kostenmodelle für die Entwicklung und Fertigung von Raumfahrtgerät. II). D. E. Koelle. *Raumfahrtforschung,* vol. 16, Jan.-Feb. 1972, p. 1-14. 42 refs. In German.

Based on previously obtained results on statistical development and fabrication cost models, the definition of a first analytical total cost model is derived which, in addition to the diverse technical factors, also takes into account the so-called management factors. These comprise the program schedule, type of organization, type of contract, etc. The total cost model makes it possible to recognize the reasons for extraordinary high costs of space projects, and to keep the anticipated space project costs at as low level as possible through the knowledge of the decisive factors involved. O.H.

A72-24449 # New concepts in work administration systems for space applications. R. L. Campbell (Boeing Co., Saturn/Apollo/Skylab Div., Washington, D.C.). *American Institute of Aeronautics and Astronautics, Man's Role in Space Conference, Cocoa Beach, Fla., Mar. 27, 28, 1972, Paper 72-244.* 8 p. Members, $1.50; nonmembers, $2.00.

Techniques developed and implemented for the administration of work in aerospace applications are presented. This includes the translation of contractual statements of work into systems which are compatible with existing Corporate requirements and which are also used for reporting in-process work to the customer. The techniques developed recognize the requirements for anticipating problems before they occur, measure the quality of work output, assess schedule accomplishment and integrate cost with work accomplishment. Example figures are presented taken from actual records of the work administered and arranged to show the flow and interrelationship as appropriate. (Author)

A72-24450 * # Cost reduction by integration of the assurance technologies. L. W. Ball (NASA, Marshall Space Flight Center, Huntsville, Ala.). *American Institute of Aeronautics and Astronautics, Man's Role in Space Conference, Cocoa Beach, Fla., Mar. 27, 28, 1972, Paper 72-245.* 8 p. Members, $1.50; nonmembers, $2.00.

It is shown how the cost of applying assurance disciplines to the development of complex systems can be reduced by integrating the mechanics of system engineering and system management into a 'Development Risk Control System'. The essential features of the integration process are examined. A 'Development Risk Management Model' is described, and the use of the model to integrate and thereby reduce the cost of other assurance disciplines is discussed and illustrated. V.P.

A72-24451 # Cost effective innovations in management of space programs . . . or . . . happiness is underrunning. W. E. Dean and C. Williams (North American Rockwell Corp., Space Div., Downey, Calif.). *American Institute of Aeronautics and Astronautics, Man's Role in Space Conference, Cocoa Beach, Fla., Mar. 27, 28, 1972, Paper 72-246.* 6 p. Members, $1.50; nonmembers, $2.00.

Some innovations in the application of basic principles of cost effective management are discussed that have been proven in managing large complex space programs. These innovations include the 'random walk,' 'think tomorrow,' and 'smiles and frowns,' with special attention to communication and problem solving. Emphasis is on the impact of such a management style on cost effectiveness. M.V.E.

A72-24452 # Product assurance program planning - Some lessons learned from Apollo. G. Sandler (Grumman Aerospace Corp., Bethpage, N.Y.). *American Institute of Aeronautics and Astronautics, Man's Role in Space Conference, Cocoa Beach, Fla., Mar. 27, 28, 1972, Paper 72-247.* 10 p. Members, $1.50; nonmembers, $2.00.

The economic aspects of product assurance activities on high-reliability space programs are discussed with a view toward finding ways to accommodate a better balance between design, test, and assurance activities. The approach proposed is based on paying more attention to construction, packaging, and process techniques, in addition to functional evaluation and inherent reliability assessment, and to prevent or catch procedural oriented failures prior to acceptance testing. To this end, units should be designed with expectation of failure, so as to minimize the rework costs and the extent of retesting. V.P.

A72-24864 # **Creation and dissemination by computer of electrical interface information in avionics systems.** D. C. J. Garrett and R. A. Bolton (E-A Space and Advanced Military Systems, Ltd., Frimley, Camberley, Surrey, England). *Aircraft Engineering*, vol. 44, Mar. 1972, p. 4-6.

Application of a computer to the solution of a communication problem in avionics systems. The problem involves the creation of a document which defines all the electrical interface connections in the system, and the dissemination of the design information contained in the document to all the project participants on a regular basis. A computer program (EMPRENT) which has the ability to select and sort designated data is described. F.R.L.

A72-24867 # **Planning and operational aspects of 'on condition' philosophies.** F. S. Nowlan (United Air Lines, Inc., Chicago, Ill.). *Aircraft Engineering*, vol. 44, Mar. 1972, p. 26-28.

Review of the practices of United Air Lines in identifying and continuing those scheduled maintenance activities which are effective in protecting reliability characteristics, and identifying and discontinuing those activities which are ineffective. Turbine engine reliability, component reliability, reliability controlled overhaul, and test and repair as necessary programs are outlined. Attention is given to system and component operating performance evaluation. F.R.L.

A72-24882 **Co-operation between the parties to the project itself and third parties.** C. B. White (Hawker Siddeley Group, Ltd., London, England). *Aeronautical Journal*, vol. 76, Mar. 1972, p. 192-194.

Problems arising between collaborating parties and outsiders are discussed. The aspects of collaborating relations with governments, government organizations, airworthiness authorities, subcontractors, financial institutions, marketing agencies, and customers are examined. V.P.

A72-24988 **Fatigue problems in modern industry.** C. Cameron (West Virginia University, Morgantown, W.Va.). *Ergonomics*, vol. 14, Nov. 1971, p. 713-720. 26 refs.

A study of fatigue in civil aircrew is briefly described and a view of fatigue as a generalized response to stress is developed from the results. The factors associated with a fatigue reaction in aircrew are identified, and it is pointed out that they derive directly from technological advances in the airline industry. Similar advances in other branches of industry may be expected to bring similar problems, notably a progressively wider adoption of shift working. Solutions may be achieved by the application of human factors principles to the full range of human factors problems in industry, and by the determination of appropriate work-rest cycles for various kinds of work. (Author)

A72-25050 # **Enhancing the effectiveness of management systems.** T. J. Kelly and M. Rabinowitz (Grumman Aerospace Corp., Bethpage, N.Y.). *American Institute of Aeronautics and Astronautics, Man's Role in Space Conference, Cocoa Beach, Fla., Mar. 27-29, 1972, Paper 72-243.* 20 p. Members, $1.50; nonmembers, $2.00.

The implementation of large and complex aerospace programs is examined from the standpoint of limiting management costs while assuring products that are delivered on-time, within budget and with technical excellence. The concepts discussed include the establishment of the appropriate level of detail for effective management control; the integration of management subsystems for assessing program progress as an interrelated set of cost, schedule and technical performance parameters; and, the optimization of government/contractor responsibilities and interfaces for maximum efficiency. The application of these techniques indicates that the public interest as well as the profitability of our corporations can both be served. (Author)

A72-26099 * # **Technology - Past, present and future.** M. A. Faget (NASA, Manned Spacecraft Center, Houston, Tex.). *AIAA Student Journal*, vol. 10, Feb. 1972, p. 6-8.

Review of the role of the space program in achieving the present level of technology in the United States. The program has created new levels in performance, precision, and reliability in many areas, and has consequently stimulated many innovations. The space program has also created new devices and materials that are suitable for commercial use. F.R.L.

A72-26284 **Forecasting through dynamic modeling.** A. W. Blackman (United Aircraft Research Laboratories, East Hartford, Conn.). *(Industrial Management Center, Conference on Technology Forecasting, Hilton Head, S.C., May 2-7, 1971.) Technological Forecasting and Social Change*, vol. 3, no. 3, 1972, p. 291-307. 9 refs.

Application of the techniques of industrial (system) dynamics to simulate a representative industrial research laboratory and to forecast the effect on future laboratory operations of matching an exploratory forecast of the laboratory's output to an exogenous goal schedule set by normative forecasts of future requirements. Intuition has been found to be unreliable when applied to multiloop, high-order, nonlinear feedback patterns characteristic of most management and social systems. The simulation outputs forecast (1) the future balance between government and internal support required to achieve the normative goals, (2) future personnel and facility requirements, (3) capital expenditures, and (4) the decision criteria required to achieve the goals and to assure orderly growth of the laboratory. F.R.L.

A72-26285 **Transportation forecasting - A review.** D. E. McDaniel (U.S. Coast Guard, Merchant Marine Technical Div., Washington, D.C.). *Technological Forecasting and Social Change*, vol. 3, no. 3, 1972, p. 367-389. 86 refs.

Examination of how technological forecasting and long-range planning have been applied to transportation. The strengths and weaknesses of forecasting approaches which have been applied to date are evaluated, and some directions for future work in transportation forecasting and planning are suggested. Major attention is given to the overall dimensions of transportation, and with the movement of people rather than goods. F.R.L.

A72-26441 # **Optimization of diagnostic tests used in monitoring the efficiency of industrial systems (Optimizatsii diagnosticheskikh testov, ispol'zuemykh pri kontrole rabotosposobnosti tekhnicheskikh ustroistv).** V. I. Perov. In: Automatic monitoring and electrical measurement methods. Volume 1.
Novosibirsk, Izdatel'stvo Nauka, 1971, p. 69-78. 8 refs. In Russian.

Formulation of problems of optimization of contracted sets of diagnostic tests for monitoring the efficiency of industrial systems. Formulations are presented for the optimization of composite diagnostic tests in the presence of constraints with regard to their completeness, for the optimization of such tests in the presence of

constraints on the costs related to carrying out the monitoring, and for the optimization of such tests to obtain a compromise relation between the monitoring costs and the utilization losses. A.B.K.

A72-26543 Planning training expenses and industrial productivity (Planification des dépenses de formation et productivité des entreprises). J. Voge (PTT; Union Radio Scientifique Internationale; Ecole Nationale Supérieure des Télécommunications, Paris, France). *L'Onde Electrique,* vol. 52, Mar. 1972, p. 99-104. In French.

Development of two empirical laws which make it possible to plan training expenses in an industrial enterprise. The first law establishes the ratio of the training facilities to the production volume or (in terms of total wage percentage) to staff productivity. The second law establishes the percentage of the work time which must be devoted to training. The application of these laws is discussed, stressing the risks involved in misunderstanding them.

A.B.K.

A72-27267 # EDP and management (EDV und Leitungstätigkeit). S. Boigk (Gesellschaft für Internationalen Flugverkehr mbH, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 8, no. 2, 1972, p. 53-57. In German.

Management activities are mainly concerned with the making of decisions. The process of decision making requires the study of suitable data. Organizational and technical aids are needed for an efficient and comprehensive utilization of the data. The approaches of electronic data processing (EDP) provide the means to solve the problems of information utilization. The aims of EDP are discussed together with management problems at the introduction of EDP.

G.R.

A72-27273 # Problems regarding the introduction of EDP into the process concerned with the material-technical supply of INTERFLUG and approaches for solving them (Probleme und Lösungswege bei der Einführung der EDV für den Prozess der materiell-technischen Versorgung der INTERFLUG). R. Drömer, H. Witzke, R. Siuda, and U. Schwemmin (Gesellschaft für Internationalen Flugverkehr mbH, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 8, no. 2, 1972, p. 94-100. In German.

Organizational changes made necessary by the introduction of EDP are discussed, giving attention to the significance of these changes, the work of groups charged with the investigation of suitable introduction procedures, aspects of political-ideological preparation, and questions of technical education. Plans for the stepwise transformation of the organization are presented. A comprehensive test has to be conducted to check functional relations between various parts of the organization. G.R.

A72-27374 # An appraisal of the role of satellites in domestic communications. T. Leming (MCI Communications Corp., Washington, D.C.). *American Institute of Aeronautics and Astronautics, Communications Satellite Systems Conference, 4th, Washington, D.C., Apr. 24-26, 1972, Paper 72-554.* 6 p. Members, $1.50; nonmembers, $2.00.

The author briefly discusses some areas in which it is believed that satellites will supplement the present terrestrial system. Improvements in network management, system reliability, broadband capacity, and earth station flexibility are considered, along with several immediate markets for a domestic satellite system. These include the leasing of voice and data transmission, low speed messenger service, cable television, electronic special delivery of mail, television and radio program distribution, and carrier trunk lines.

D.F.L.

A72-27654 * Characteristics of individuals with high information potential in government research and development organizations. W. E. Holland (Houston, University; NASA, Manned Spacecraft Center, Houston, Tex.). *IEEE Transactions on Engineering Management,* vol. EM-19, May 1972, p. 38-44. 30 refs.

In order to study focal individuals within informal communications networks, a special variable was constructed: information potential (IP) was defined as the information-source value placed on an individual by his colleagues. Four hypotheses involving IP were tested in three R&D organizations using questionnaires and pencil-and-paper tests. Results indicated that the individual with high IP used more and different sources of technical information, was seen to be a credible information source and to have a strong ability to associate seemingly unrelated ideas, and was as approachable as the other members of his organization. Four tentative conclusions may be drawn from this study concerning the person with high IP. He is (1) an identifiable individual in several different kinds of organizations; (2) a distinctive information transceiver (transmitter and receiver); (3) both a producer and a catalyst in his own organization; and (4) an extender and an amplifier of information search. To affect the efficiency of informal information flow, the research manager's best hope for positively influencing informal networks lies in the identification and motivation of the special communicators in his organization. (Author)

A72-27655 Relationship between productivity, satisfaction, ability, age, and salary in a military R&D organization. H. F. Vincent (U.S. Army, Research Development Engineering and Missile System Laboratory, Redstone Arsenal, Ala.) and A. Mirakhor (Alabama, University, Huntsville, Ala.). *IEEE Transactions on Engineering Management,* vol. EM-19, May 1972, p. 45-53. 53 refs.

The overall objective of this study is to analyze the results of data obtained from 94 questionnaires administered to 100 scientists and engineers employed in the Missile Systems Laboratory of the U.S. Army Missile Command in order to empirically investigate and identify the most important features of an engineer's or scientist's work environment as they relate to job satisfaction and productivity, and to recommend necessary steps for improvement of working climate in the laboratory. More specifically, the data are analyzed (1) to determine the factors involved in job satisfaction; (2) to relate productivity to job satisfaction, salary, and age of respondents; and (3) to determine, using a chi-square test of independence of classification, if there is any relationship between productivity and job satisfaction. The general conclusions arrived at, based on the sample information, are that (1) job satisfaction is a multi-dimensional factor; (2) there is general agreement between the findings of this study and similar studies - the points of similarities and dissimilarities are discussed; and (3) there is statistically, significant relationship between productivity and satisfaction.

(Author)

A72-28352 The role of reliability in commercial and military telecommunication satellite system planning. G. Mariani (Società Finanziaria Telefonica, Rome, Italy). In: Operations research and reliability; Proceedings of the Conference, Turin, Italy, June 30-July 4, 1969. New York, Gordon and Breach, Science Publishers, Inc., 1971, p. 5-45. 17 refs.

An economic analysis of a telecommunication satellite is first presented, and the influence of reliability on costs is considered in detail. Earth station redundances and reliabilities are discussed. The problem of maintenance, spare levels, and control systems for fault location is also dealt with. Finally, special reliability problems associated with a military telecommunication satellite system are examined. O.H.

A72-28354 Incentive contracts and price differential acceptance tests. II. B. J. Flehinger and J. M. Miller (IBM Thomas J. Watson Research Center, Yorktown Heights, N.Y.). In: Operations research and reliability; Proceedings of the Conference, Turin, Italy,

June 30-July 4, 1969. New York, Gordon and Breach, Science Publishers, Inc., 1971, p. 121-142; Discussion, p. 143.

This paper is concerned with acceptance test plans designed to motivate a producer to improve his product. Test strategies in which the price paid for a product depends upon the outcome of an acceptance test are discussed. It is assumed that the producer's manufacturing cost and the value of the product to the consumer are both known functions of some quality parameter or parameters such as the failure rate. The test strategy creates a climate in which the producer serves his own self-interest best by investing money in product improvement. Admissible strategies are defined in terms of limited risk to both parties and maximum expected profits subject to these limitations. A procedure for finding the admissible strategies for a repairable system in which the sequence of failures is generated by a Poisson process is described. (Author)

A72-28452 # **Air cargo confidence.** C. R. Frieze (Boeing Co., Seattle, Wash.). *Astronautics and Aeronautics,* vol. 10, May 1972, p. 48-54.

The growth potential in the air-cargo field is discussed, giving attention to market status, marketing techniques, and the potential impact of progress in technology. Factors of minimum long-term growth are examined. It is pointed out that the bulk of new lift requirements must be satisfied by large freighter aircraft if air cargo is to achieve reasonable profits. The international routes require the greatest lift addition. The need for a reexamination of the market and the possible changing of routes to fit the geography of specific commodity-production centers is considered. G.R.

A72-29168 # **Optimal statistical plant control in machine building (K optimal'nomu upravleniiu statisticheskimi ob'ektami v mashinostroenii).** L. A. Sorokoletov. In: Adaptive systems. Large systems. Moscow, Izdatel'stvo Nauka, 1971, p. 198-206. In Russian.

An algorithm is developed to obtain an optimal strategy in maintaining statistical plant control in machine part production and assembling. A procedure is set forth for statistical modeling of linear daily control methods in mechanical engineering. Errors of measuring equipment are discussed as factors affecting a statistical control operation. V.Z.

A72-30822 # **Problems of personnel planning in the field of aircraft maintenance (Probleme der Arbeitskräfteplanung im Bereich Flugzeuginstandhaltung).** P. Bork and R. Wollschläger (Gesellschaft für Internationalen Flugverkehr mbH, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 8, no. 1, 1972, p. 34-45. In German.

Questions regarding the planning of different types of maintenance work are discussed together with the relations between maintenance personnel and the time required for the maintenance of the aircraft. A formula is presented for computing the number of flying hours on the basis of various parameters connected with the maintenance operations. Questions of economics are taken into account in deriving optimal maintenance conditions for an aircraft including the employment of the required maintenance personnel. G.R.

A72-30823 # **Problems at the introduction of electronic data processing into the procedure for the material-technical supply of Interflug and approaches to solve them. I (Probleme und Lösungswege bei der Einführung der EDV für den Prozess der materiell-technischen Versorgung der Interflug. I).** R. Drömer, H. Witzke, R. Sluda, and U. Schwemmin (Gesellschaft für Internationalen Flugverkehr mbH, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 8, no. 1, 1972, p. 46-52. In German.

The application of the methods of electronic data processing is to increase the efficiency of the procedures concerned with the maintenance of aircraft and auxiliary equipment. The various processes in the system of material-technical supply are examined together with the factors which have to be taken into consideration during the first phase of the introduction of electronic data processing. Attention is given to basic data, data regarding the material, questions concerning the prediction of material requirements, and aspects of receiving and routing the material. G.R.

A72-30848 **Quality assurance of electronic components - Recent developments (Assurance de la qualité des composants électroniques - Récents développements).** G. Peyrache (Fédération Nationale des Industries Electroniques, Paris, France). *L'Onde Electrique,* vol. 52, Apr. 1972, p. 192-197. In French.

A review of the basic quality-assurance concepts, ways, and means, specific to the field of electronic components, is followed by a survey of the efforts made in France, in the course of the last ten years, particularly, in the areas of specifications and controls. The distinctive features and advantages of the French centralized quality control system are pointed out. Changes recently introduced in the French organization are described, and its links with the European Committee for the Coordination of Electrotechnical Norms and with similar worldwide bodies are discussed. M.V.E.

A72-30868 # **The role of technological forecasting in analysis and planning of new ventures.** A. W. Blackman, Jr. (United Aircraft Research Laboratories, East Hartford, Conn.). *American Society of Mechanical Engineers, Design Engineering Conference and Show, Chicago, Ill., May 8-11, 1972, Paper 72-DE-26.* 20 p. 29 refs. Members, $1.00; nonmembers, $3.00.

A system for the analysis and planning of new ventures is developed which provides a structure for the application of logical, mathematical, and scientific procedures to decision problems which (1) involve a significant portion of an organization's resources, (2) have long term effects on a firm's future success, and (3) are characterized by uncertainty in many of the factors important to the decision. The system is based on a synthesis of various analytical techniques from the fields of technology forecasting, decision analysis, and system dynamics and provides a general methodology for rank-ordering new venture candidates and determining the resource allocation level required for new venture portfolios designed to achieve long term growth objectives. The role played by technological forecasting in new venture planning and in the selection of engineering projects is discussed. (Author)

A72-31696 * # **A computer method for schedule processing and quick-time updating.** W. H. McCoy (NASA, Kennedy Space Center, Fla.). *American Institute of Aeronautics and Astronautics and NASA, Space Shuttle Operations, Maintenance, and Safety Technology Conference, Cocoa Beach, Fla., Mar. 29, 1972, Paper.* 23 p.

A schedule analysis program is presented which can be used to process any schedule with continuous flow and with no loops. Although generally thought of as a management tool, it has applicability to such extremes as music composition and computer program efficiency analysis. Other possibilities for its use include the determination of electrical power usage during some operation such as spacecraft checkout, and the determination of impact envelopes for the purpose of scheduling payloads in launch processing. At the core of the described computer method is an algorithm which computes the position of each activity bar on the output waterfall chart. The algorithm is basically a maximal-path computation which gives to each node in the schedule network the maximal path from the initial node to the given node. D.F.L.

A72-32215 # **Use of procurement techniques similar to civil avionics in order to reduce military systems' costs.** J. S. Gansler (ITT, ITT Avionics Div., Nutley, N.J.). In: Navigation for general aviation and navigation training; Proceedings of the National Air Meeting, Atlanta, Ga., Feb. 29-Mar. 2, 1972. Washington, D.C., Institute of Navigation, 1972, p. 92-98. 7 refs.

There has been much talk recently about the desirability of using civil avionics procurement techniques in order to reduce the military systems' costs. This paper attempts to quantify some of this discussion. Specifically, it addresses itself to three financial problem areas of military avionics procurement: (1) high acquisition costs, (2) significant program cost growths, and (3) large total costs-of-ownership. This paper suggests further techniques which can be learned from the civil area for greater cost reductions. Particular emphasis is given to cost/reliability design criteria and to warranty to cover follow-on costs. Specific examples of potential overall cost savings on airborne avionics equipment are presented for these recommended cost saving techniques. (Author)

A72-32451 **Managing to be on time: A total system approach in aircraft operations; Royal Aeronautical Society, Spring Convention, London, England, May 10, 11, 1972, Proceedings.** London, Royal Aeronautical Society, 1972. 205 p.

The papers deal with management of short-haul airlines to ensure on-time operations, time schedules in a military environment, airport problems affecting on time operations, and air traffic control with reference to system coodination. Some of the current activities by which product support can help operators to minimize delays are reviewed. The design approach to maintainability of Concorde engines, the role of the management information system, and the influence of airframe design on availability are discussed. An attempt is made to review the total management problem of staying on time with the Concorde. F.R.L.

A72-32458 # **Managing to be on time - The role of the management information system.** R. Morris. In: Managing to be on time: A total system approach in aircraft operations; Royal Aeronautical Society, Spring Convention, London, England, May 10, 11, 1972, Proceedings. London, Royal Aeronautical Society, 1972. 15 p.

Discussion of the management information system, which provides the 'adaptive' part of an adaptive control system which enables management to choose the hardware which needs to be adjusted by modification or replacement, to adjust and adapt the human resources, and to modify the communications systems themselves so that performance can be improved. The principles of the RAF system, described in detail, involve (a) a unified system, standardized throughout the service, based on a single design document (the job card), and (b) the elimination of transcription. The man who originates the card creates a copy for the data center, although this is supplemented by subsequent coding processes. F.R.L.

A72-32460 # **Concorde - Timesaver.** E. H. Burgess and W. A. N. Ford (British Aircraft Corp., Ltd., London, England). In: Managing to be on time: A total system approach in aircraft operations; Royal Aeronautical Society, Spring Convention, London, England, May 10, 11, 1972, Proceedings.
London, Royal Aeronautical Society, 1972. 18 p.

Attempt to review the total management problem of staying on time with the Concorde. Considerable benefits have been derived from a close relationship between the potential operators and the designers. From the start of the design phase of Concorde it was the intention that, as far as possible, the aircraft should not require special treatment at the airports. The necessarily long undercarriage of the Concorde makes for some accessibility problems. The narrow fuselage entails reduced volume available for systems. Techniques are being developed for the diagnosis and onward reporting of in-flight failures. Attention is given to operations, scheduling flexibility, and arrival reliability. F.R.L.

A72-32615 # **A methodology for evaluation of capital expenditure alternatives.** H. L. de la Puente (McDonnell Douglas Astronautics Co., Huntington Beach, Calif.). In: Environmental progress in science and education; Institute of Environmental Sciences, Annual Technical Meeting, 18th, New York, N.Y., May 1-4, 1972, Proceedings. Mount Prospect, Ill., Institute of Environmental Sciences, 1972, p. 270-276.

It is pointed out that there is a need for a method of evaluating capital expenditure alternatives that considers all important criteria and probable states of nature. The method should quantify the answer to arrive at a single numerical merit value for each alternative. A method is proposed that considers various criteria, and establishes expected values for each alternative, given different probable conditions or states of nature. The method proposed is graphically depicted by its use in the evaluation of six available alternatives in the future disposition of an existing acoustic facility and its equipment. G.R.

A72-33329 # **Design factors - Passenger and cargo terminals and associated handling areas.** E. B. Tutty (International Air Transport Association, Montreal, Canada). In: Civil Aviation Safety Centre, Annual Technical Conference, 6th, Beirut, Lebanon, November 30-December 3, 1971, Final Report.
Beirut, Civil Aviation Safety Centre, 1971. 15 p.; Discussion. 3 p.

The design and layout planning of a passenger terminal complex in a major civil airport are examined in terms of systems and flow routes intended to facilitate and shorten the beginning or the end of a journey by air. Requirements and guidelines are given for the design of the interface with surface transit systems, check-in facilities, government control areas, information centers, baggage handling systems, passenger loading bridges, gate lounges, and electronic equipment. Aircraft parking aprons and required aircraft maneuvers are considered together with cargo handling facilities. T.M.

A72-33332 # **Factors affecting growth of civil aviation in developing countries.** S. Medhane (Ethiopian Airlines, S.C., Addis Ababa, Ethiopia). In: Civil Aviation Safety Centre, Annual Technical Conference, 6th, Beirut, Lebanon, November 30-December 3, 1971, Final Report. Beirut, Civil Aviation Safety Centre, 1971. 11 p.; Discussion. 3 p.

Economic growth and future welfare of underdeveloped nations are shown to be strongly dependent on the establishment of efficient civil aviation, and special problems faced by airlines in these countries are outlined. Factors governing the evolution of airlines are identified with a realistic assessment of the role to be played, proper allocation of funds by governments; credibility in the international money markets, sufficient skilled manpower, suitable equipment, realistic fare structures, expansion of tourist travel, and interline cooperation. T.M.

A72-33347 * **Computer calculation of device, circuit, equipment, and system reliability.** D. R. Crosby. *IEEE Transactions on Reliability*, vol. R-21, May 1972, p. 84-86. NASA-supported research.

A grouping into four classes is proposed for all reliability computations that are related to electronic equipment. Examples are presented of reliability computations in three of these four classes. Each of the three specific reliability tasks described was originally undertaken to satisfy an engineering need for reliability data. The form and interpretation of the print-out of the specific reliability computations is presented. The justification for the costs of these computations is indicated. The skills of the personnel used to conduct the analysis, the interfaces between the personnel, and the timing of the projects is discussed. (Author)

A72-33374 **The effect of regulation on the cost performance and growth strategies of the local service airlines.** G. Eads. *Journal of Air Law and Commerce,* vol. 38, Winter 1972, p. 1-34. 50 refs.

It is shown that the performance of local service carriers has fallen short of the goals set by the Civil Aeronautics Board when this carrier group was established in the 1940s. The failure is attributed mostly to faulty government regulation. It is shown that the quality and quantity of airline service provided to the smaller communities has deteriorated over the last ten years, while the cost to the federal government of providing this service has increased. Of the options which the government now has, preference is given to the option of permitting the CAB to try a new scheme of subsidization involving competitive bidding for the right to provide stated quantities of service. Superior service at substantially lower cost is expected from this step, but pitfalls which may prevent such a scheme from working in practice are pointed out. V.P.

A72-33375 **The Brazilian experiment in the creation of an aircraft industry.** B. M. Carl (Southern Methodist University, Dallas, Tex.). *Journal of Air Law and Commerce,* vol. 38, Winter 1972, p. 35-51. 76 refs.

The methods employed in Brazil to finance the creation of a domestic aviation industry are examined. In structuring its development laws, Brazil adopted a unique approach of 'mixed-economy' corporations. By this blend of public and private ownership, coupled with foreign and domestic technology and a system of tax incentives designed to assist in obtaining adequate capitalization, Brazil hopes to overcome the economical and technical obstacles to the achievement of an industry competitive in the world market. If successful, the Brazilian venture may serve as a model for other countries in their economic development. V.P.

A72-33598 **Program choice in the aerospace industry.** D. S. Warren (Lockheed Missiles and Space Co., Sunnyvale, Calif.). *California Management Review,* vol. 14, Summer 1972, p. 87-93.

The issues which aerospace management must face in deciding what weapon system programs to pursue at the early concept-formulation stage are discussed from the perspective of a market analyst. The three major considerations are shown to be: program value (benefits vs cost), probability of company success in capture, and probability of program occurrence. A family of stand-off, tactical, interdiction missiles is used as a means of illuminating the analytical issues involved. A simplifying relationship is developed which provides a shorthand device for ranking programs according to their gross preferability. M.V.E.

A72-34389 **North American gears to produce B-1.** R. R. Ropelewski. *Aviation Week and Space Technology,* vol. 96, June 26, 1972, p. 53, 55-57, 59.

The work concerning the B-1 advanced strategic bomber is at the moment still mostly in the engineering stage. However, the percentage of work devoted to production planning is increasing rapidly. Requirements and schedules for production engineering, tooling, manpower, and costs are being determined. Tests on several structural aircraft components are being conducted including the wing center section, the crew capsules, the wing pivot bearings, the horizontal stabilizer, soft ride control vanes, double-slotted flaps, a flexible wing fairing closure structure, and dual compression landing gear struts. G.R.

A72-34391 **Northrop streamlines A-9A management.** *Aviation Week and Space Technology,* vol. 96, June 26, 1972, p. 107, 109, 111, 113.

The A-9 is a twin-engine aircraft designed to provide close-support fire, armed escort and reconnaissance against enemy ground forces. Horizontal and vertical stabilizers are used by the aircraft. A 30-mm Gatling-gun-type cannon is to be mounted along the longitudinal center-line of the fuselage. The organization used for designing and building the aircraft is discussed together with organizational changes in connection with the production planning effort. It is pointed out that cost controls are a primary consideration in the A-9 program. Low cost is to be preferable to excess performance beyond stated requirements. G.R.

A72-34461 **Parametric cost estimating aids DOD in systems acquisition decisions.** D. W. Srull (U.S. Department of Defense, Washington, D.C.). *Defense Management Journal,* vol. 8, Apr. 1972, p. 2-5.

The parametric approach considers system 'output' characteristics such as speed and thrust. Relationships between such output characteristics and system costs are developed on the basis of historical defense system cost experience. The empirical relationships obtained are employed in a projection of the costs of a new system. The advantages of the parametric approach are discussed together with some problems in the use of parametric procedures, and applications of parametric estimating. G.R.

A72-34462 **The challenge of cost-to-produce.** E. T. Reich (U.S. Department of Defense, Washington, D.C.). *Defense Management Journal,* vol. 8, Apr. 1972, p. 6-10.

The significance of cost as a design parameter is discussed, giving attention also to the things which are needed if cost-to-produce is to become a meaningful requirement. Parametric estimating could provide initial estimates of cost-to-produce. Factors to be considered in cost-to-produce contractual arrangements are considered together with some of the advantages and disadvantages of the cost-to-produce concept. G.R.

A72-34463 **AFSC procurement evaluation panel - New check in defense systems acquisition.** E. F. O'Connor (USAF, Systems Command, Andrews AFB, Washington, D.C.). *Defense Management Journal,* vol. 8, Apr. 1972, p. 11-16.

It is the function of the AFSC Headquarters Procurement Evaluation Panel to conduct a last critical evaluation of a new defense system procurement before the release of the documentation to the industry. The membership composition of the panel is discussed together with details regarding the operation of the panel, the systems selected, and the results obtained. The results of the recommendations of the panel are improved specifications, increased competition, better planning, and reduced data requirements. G.R.

A72-35339 **Resource analyses for R & D programs.** E. N. Dodson (General Research Corp., Santa Barbara, Calif.). *IEEE Transactions on Engineering Management,* vol. EM-19, Aug. 1972, p. 78-86. 13 refs. DOD-Army-supported research.

Two studies of R & D resource requirements are discussed. The first includes a procedure for measuring state-of-the-art advance and incorporating the measure in an estimating relationship for development cost and time. The second study includes a procedure for evaluating management strategies in terms of time, cost, and risk. (Author)

A72-35340 **Evaluating alternate paths in R & D project planning.** E. M. Howard and W. G. Yule, Jr. (IBM Corp., Owego, N.Y.). *IEEE Transactions on Engineering Management,* vol. EM-19, Aug. 1972, p. 86-92. 12 refs.

It is shown that R and D project planning comes down to the assessment of risk, and the subjective probabilities needed for risk analysis are illustrated. It is pointed out that methods exist for handling complicated problems in probability, once the underlying R and D problem is defined, interdependences are established, and the required times, costs, and subjective probabilities are estimated. V.P.

A72-35341 * **An operations research approach to solve complex and unstructured problems illustrated for the case of cost-plus-award fee contracts.** J. E. Thomas (East Texas State University, Commerce, Tex.), E. J. Manton (NASA, Kennedy Space Center, Fla.), and J. T. Stoms (Florida Institute of Technology, Melbourne, Fla.). *IEEE Transactions on Engineering Management*, vol. EM-19, Aug. 1972, p. 102-105.

A72-35441 # **Problems of the control of the maintenance process (Probleme der Steuerung des Instandhaltungsprozesses).** P. Bork (Gesellschaft für Internationalen Flugverkehr mbH, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt*, vol. 8, no. 4, 1972, p. 183-196, 170. 9 refs. In German.

Aspects of planning the maintenance process are considered together with questions of process guidance, work distribution patterns, and time schedules. Formulas for the determination of aircraft availability are provided together with examples showing the calculation of the number of aircraft which are operational. The time required for the maintenance of an aircraft is a function of the manpower available for maintenance operations. Required statistical data and questions of an evaluation of the maintenance process are also discussed. G.R.

A72-35951 # **Part procurement difficulties in the space field (Difficultés d'approvisionnement des composants dans le domaine spatial).** C. M. Marcovici (Engins Matra, S.A., Vellizy-Villacoublay, Yvelines, France). *Industries Atomiques et Spatiales*, vol. 16, Mar.-Apr. 1972, p. 111-114. In French.

Review of the difficulties encountered by the French aerospace industry in procuring parts in both Europe and the U.S. Two possible solutions to the problem are suggested - namely, a centralization of purchasing by a national, European, or even private organization, or else the setting up of stocks of parts by the aerospace industry or by the parts manufacturers themselves. A.B.K.

A72-36074 # **Competitive prototyping - A development strategy.** D. H. Strube (USAF, Washington, D.C.). *Air University Review*, vol. 23, May-June 1972, p. 2-11.

Description of a strategy based on competitive prototyping to reduce the risks and uncertainties associated with weapon system development and to provide a variety of hardware options that are readily available for application to military requirements. The proposed strategy is based on the requirement that firms build working models of a proposed weapon system before committing the system to full-scale development. Among the key features or characteristics of the competitive prototype program are new or renewed emphasis on simplified and streamlined management and procurement approaches, minimal documentation and reporting, and performance measurement and evaluation. A.B.K.

A72-36777 # **Airports and airways system planning.** D. R. Miller (Daniel, Mann, Johnson, and Mendenhall, Los Angeles, Calif.). In: Airports: Key to the air transportation system; Proceedings of the Conference, Atlanta, Ga., April 14-16, 1971.
New York, American Society of Civil Engineers, 1972, p. 7-33.

Evaluation of the impact of recent federal legislation on airport and airway system planning, and review of the current 'state of the art' of such planning. The Airport and Airway Development Act of 1970 is shown to have a fundamental effect on aviation system planning and development. The transition to systems planning is not expected to be easy. Aviation planning agencies must become familiar with the techniques of systems planning and plan their programs in harmony with prevailing budget and schedule requirements. Relationships must be established by federal, state, and local agencies with the aviation industry and the public. As examples of current state airport system planning, the South Dakota State Airport System Plan and the California Statewide Master Plan of Aviation are discussed. M.V.E.

A72-36779 # **Economics of a new regional airport.** J. D. Downey (Dallas/Fort Worth Regional Airport, Arlington, Tex.). In: Airports: Key to the air transportation system; Proceedings of the Conference, Atlanta, Ga., April 14-16, 1971.
New York, American Society of Civil Engineers, 1972, p. 57-71.

Review of the many factors that affect the economy of a planned airport, and discussion of the prerequisites to an effective control of these factors. Recommended measures include: total-costs encompassing estimates; liberal spending in the preparation of an effective bond sales campaign; early establishment of proper relations with all the people involved in the development and expenditure of funds for the planned airport; and careful timing of the airport construction operations in order to avoid escalation and interest on unused capital at the end. M.V.E.

A72-37093 **The future of general aviation in Europe.** G. F. Brewer (Cessna Aircraft Co., Wichita, Kan.). *Aeronautical Journal*, vol. 76, June 1972, p. 352-357; Discussion, p. 357-361. 5 refs.

A72-37118 # **Organization of fabrication to obtain high-reliability hybrid circuits (Organisation de la fabrication pour l'obtention de circuits hybrides haute fiabilité).** M. J. Lacroix (Société Industrielle des Nouvelles Techniques Radioélectriques et de l'Electronique Française, Asnières, Hauts-de-Seine, France). In: High reliability electronic components; International Conference, Toulouse, France, March 6-10, 1972, Proceedings.
Paris, Centre National d'Etudes Spatiales, 1972, p. 205-216. In French.

Development of an approach to ensuring the production of high-reliability thin-film hybrid resistor circuits. The method of fabrication of these components is briefly reviewed, the type of premises and personnel used for the fabrication process is described, and a procedure for ensuring quality control of passive circuits on the basis of short-term tests is outlined. On the basis of the results obtained by using this approach a procedure for ensuring proper fabrication, selection, and high-reliability treatment of the components is recommended. A.B.K.

A72-37124 # **Experience acquired by Cifas in parts procurement for the Symphonie satellite (Expérience du Cifas sur l'approvisionnement des composants pour le satellite Symphonie).** P. Rousseau and H. Skoczdopole. In: High reliability electronic components; International Conference, Toulouse, France, March 6-10, 1972, Proceedings. Paris, Centre National d'Etudes Spatiales, 1972, p. 309-316. In French.

Description of a procedure developed to minimize the probability of procurement of defective parts for the Symphonie satellite project. The proposed procedure is based on the establishment of a list of manufacturers capable of producing high-reliability parts, the establishment of a list of parts requirements for the Symphonie satellite, and the selection or preparation of parts procurement specifications compatible with the specified mission of the system. It also provides for monitoring and inspecting the work of subcontractors in the fabrication, delivery, and qualification stages. A.B.K.

A72-37125 # **Procurement of components in the aerospace field (Approvisionnement des composants dans le domaine spatial).** C. M. Marcovici (Engins MATRA, S.A., Paris, France). In: High reliability electronic components; International Conference, Toulouse, France, March 6-10, 1972, Proceedings.
Paris, Centre National d'Etudes Spatiales, 1972, p. 317-321. In French.

Review of some of the problems encountered in the procurement of aerospace materiel components, both in Europe and in the U.S.A. The merits of two approaches are considered: the centralization of purchases in an organization either national, European, or even private; or the creation of inventories maintained by the materiel or component manufacturers. M.V.E.

A72-37126 # **Problems confronting the engineer in charge of procurement of components intended for electronic aerospace systems (Problèmes qui se posent à l'ingénieur chargé de l'approvisionnement de composants destinés à la réalisation d'équipements électroniques pour l'espace).** M. D. Tabet (Laboratoire Central de Télécommunications, Paris, France). In: High reliability electronic components; International Conference, Toulouse, France, March 6-10, 1972, Proceedings. Paris, Centre National d'Etudes Spatiales, 1972, p. 323-331. In French.

A72-37128 # **Standardization and reliability assurance on the national and European levels (Normalisation et assurance de la *fiabilité sur le plan national et Européen*).** M. H. Arciszewski (Centre National d'Etudes Spatiales, Toulouse, France). In: High reliability electronic components; International Conference, Toulouse, France, March 6-10, 1972, Proceedings. Paris, Centre National d'Etudes Spatiales, 1972, p. 339-345. In French.

A72-37134 # **GFW - Program of high reliability electronic parts.** W. Geist (Gesellschaft für Weltraumforschung mbH, Bonn, West Germany). In: High reliability electronic components; International Conference, Toulouse, France, March 6-10, 1972, Proceedings. Paris, Centre National d'Etudes Spatiales, 1972, p. 397-407.

The problem of requirements for high reliability parts where production is not continuous is explored and the significance of qualification and verification of qualification is defined. With this goal clearly stated a qualification procedure and all-encompassing requirements are developed. An assisting inspection agency assures proper understanding and implementation of the qualification. The mechanics of performing these tasks covering the broad spectrum of electronic parts and the organization needed to effect the growth and maintenance of this work is presented. (Author)

A72-38024 **R and D resource allocation - A quantitative aid.** R. G. Block (USAF, Avionics Laboratory, Wright-Patterson AFB, Ohio). *Research/Development*, vol. 23, Aug. 1972, p. 20-24. 6 refs.

Description of a method to give quantitative aid to R & D managers faced with limited budgets and proposed programs of widely varying potential payoffs, stages of advancement, and resource requirements. Resources are allocated among various projects, which are broken down into task areas and the tasks into work units. A work unit is the smallest identifiable level of effort within the laboratory. As a first step, the work units must be evaluated against the overall goals of the organization. In total, the factors of objective importance, success, efficiency, and industrial funding are envisioned and given additive weights indicative of the present R & D climate. Real world results are assessed. F.R.L.

A72-38302 **From concept to integrated system - Interaction between subsystem and total system in the course of design, development, and testing (Von der Konzeption zum integrierten System - Wechselwirkung zwischen Untereinheit und Gesamtsystem in Entwurf, Entwicklung und Erprobung).** L. Miller (Messerschmitt-Bölkow-Blohm GmbH, Ottobrunn, West Germany). In: INTERKAMA 1971; International Congress with Exposition for Measurement Technology and Automation, 5th, Düsseldorf, West Germany, October 14-20, 1971, Reports. Munich, R. Oldenbourg Verlag, 1972, p. 81-90. 10 refs. In German.

Review of some tested procedures for the solution of design problems of integrated systems. These procedures represent the experience product of work upon space travel control problems and are based on an assumed analogy between the process of technical system development and the operation of an automatic control system. Following a description of these procedures in application to the development of a project and after a division into phases of the development process, several typical examples borrowed from such major projects as the Europa I, II, and III rockets and the Symphonie communication satellite are used to illustrate some of the significant features of the proposed procedures. M.V.E.

A72-38303 **Systems management in major projects exemplified by the German Satellite Control Center (Systemführung bei Grossprojekten am Beispiel des deutschen Satelliten-Kontrollzentrums).** W. Zander (Elektronik-System Gesellschaft mbH, Munich, West Germany). In: INTERKAMA 1971; International Congress with Exposition for Measurement Technology and Automation, 5th, Düsseldorf, West Germany, October 14-20, 1971, Reports. Munich, R. Oldenbourg Verlag, 1972, p. 98-109. 10 refs. In German.

Review of the responsibilities, management goals, organization structure, and facilities of the German Satellite Control Center, particularly, with respect to the German-American scientific satellite AZUR experiment project. The responsibilities included the financing and management of the project, the design and realization of the satellite experiment hardware, and the processing and analysis of the experiment results obtained, while management goals were set on fulfilment of technical objectives within planned time and budget limits at the highest possible cost efficiency. The evolution of the AZUR project is described, with special attention to the organization and plant adjustments elicited by the particular tasks of each realization stage of the project. M.V.E.

A72-38310 **Communication - Man - Process control computer: Problems and solutions for dialog and control center planning (Kommunikation - Mensch - Prozessrechner: Probleme und Lösungen für Dialog und Leitstandplanung).** J. Reetz (IBM Deutschland, Sindelfingen, West Germany). In: INTERKAMA 1971; International Congress with Exposition for Measurement Technology and Automation, 5th, Düsseldorf, West Germany, October 14-20, 1971, Reports. Munich, R. Oldenbourg Verlag, 1972, p. 198-207. In German.

The present situation in industry concerning applications of control center technology and process control computers, and the relation between them is examined, giving particular attention to enterprises manufacturing concrete. Certain problems which have to be solved to ensure efficient production are related to information flow, criteria for control room planning, and the operation of control rooms. The most important objectives for planners of control rooms and process control computers are listed. Problems for computer and control center personnel are discussed. Possibilities for solving the various problems with the aid of the functional devices of the new concept considered are investigated, and a description of the whole system is presented, taking into account process control computers and the program concept. G.R.

A72-38566 **CNES planning program and the sixth plan. I (La planification au CNES et le VIe plan. I).** H. Daspet, C. Guillard, J. Larabi, F. Jean-Louis, and G. Coste (CNES, Direction des Programmes et du Plan, Paris, France). *La Recherche Spatiale*, vol. 11, July-Aug. 1972, p. 1-24. In French.

Consideration of CNES planning, which is a tool at the service of the general management, making it possible to increase immediate and future efficiency in stressing the participation of all those who work with it. Orientation, operation, and control of activities are discussed. Instruments of orientation involve predictions for short, medium, and long terms. Governing principles for the execution and control of planned operations are outlined. The method of elaborating programs for technical studies, and the method of choice between concurrent projects in space meteorology (Météosat) are described. An econometric study of the space nuclear reactor is to be made. The second stage of planning, the programming, is treated. F.R.L.

A72-39397 # Recent advances in R & D value measurement and project selection methods. N. R. Baker and J. R. Freeland (Georgia Institute of Technology, Atlanta, Ga.). *Operations Research Society of America, National Meeting, 41st, New Orleans, La., Apr. 26-28, 1972, Paper.* 43 p. 237 refs. Army-supported research.

An assessment is made of published studies concerning quantitative models of R and D project selections and resource allocation decisions in order to update the last available assessment of 1967. Special consideration is given to a survey of 1964 by Baker and Pound and to a survey of 1967 by Cetron et al. Suggestions are made for further studies in the field. V.Z.

A72-40865 Public policy and the domestic satellite industry. W. R. Hinchman (Executive Office of the President, Office of Telecommunications Policy, Washington, D.C.). In: Annual International Conference on Communications, 8th, Philadelphia, Pa., June 19-21, 1972, Conference Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1972, p. 10-1 to 10-4. 5 refs.

Public policy toward domestic satellite communications takes into consideration the satisfaction of important consumer needs, attraction of necessary investment capital, creation of a stable legal and regulatory environment, avoidance of abusive monopoly power and practices, efficient use of spectrum resources, and the vitality and technological leadership of the communications/electronics industry. A policy of open entry can be expected to result in a viable competitive industry, with return on capital commensurate with risks. F.R.L.

A72-40970 Improving R & D management through prototyping. D. Packard (Hewlett-Packard Co., Palo Alto, Calif.). *Defense Management Journal,* vol. 8, July 1972, p. 3-6.

It is pointed out that cost overruns were the most visible symptom in the development of new weapons. Other problems include long development times and unsatisfactory reliability. Problems of estimating cost are examined together with aspects of development and testing before production, and questions of system program reliability. Use is to be made of prototypes to correct some of the failings characteristic of the total defense system approach. The prototype approach is considered in two separate phases including the advanced prototype and the production prototype. G.R.

A72-40971 Air Force looks forward to return to prototyping. O. J. Glasser (USAF, Washington, D.C.). *Defense Management Journal,* vol. 8, July 1972, p. 14-18, 60.

An effective balance must be achieved between theoretical studies and hardware prototyping in determining what defense systems can and should be developed to meet future needs. The basic motivating factor concerning a return to prototyping is to reduce the uncertainty regarding the merits of a new defense system. Prototypes will contribute to a solution of many problems encountered while penetrating unexplored flight performance regions. Prototypes help also to expose many design oversights. General aspects of the advanced prototype program are discussed together with specific advanced prototype projects. G.R.

A72-40972 Complex defense systems require good design teams. A. Shapero (Texas, University, Dallas, Tex.). *Defense Management Journal,* vol. 8, July 1972, p. 34-38.

It was found that French aerospace firms use significantly less engineering manhours to develop a certain defense system than American companies. Reasons for the great difference in the resources required for defense systems development are examined. The characteristics of a good design team are discussed together with the effect of procurement practices, aspects of project orientation, documentation, and needed improvements. It was found that performance is a direct function of the time a team works together. It is suggested to start a program for gradual, steady and definite disengagement from the mass of entangling documentation and management requirements that are presently required of the contractors. G.R.

A72-40974 IR & D Data Bank established. D. D. Acker. *Defense Management Journal,* vol. 8, July 1972, p. 45-48, 59.

An Independent Research and Development (IR & D) Data Bank has been established at the Defense Documentation Center at Cameron Station, Alexandria, Va., in coordination with the Office of the Director of Defense Research and Engineering. This IR & D Data Bank will provide a centralized body of limited technical and management information that will enable DOD scientists, engineers, and managers to identify the independent technical projects being conducted in the defense industry. G.R.

A72-41608 # National aeronautical facilities program /NAFP/. J. S. Kamchi and J. D. Johnston (USAF, Development and Acquisition Directorate, Washington, D.C.). *American Institute of Aeronautics and Astronautics, Aerodynamic Testing Conference, 7th, Palo Alto, Calif., Sept. 13-15, 1972, Paper 72-1033.* 5 p. 11 refs. Members, $1.50; nonmembers, $2.00.

The program is reviewed from its inception to the present time. It began when the problem of using or modifying the existing engine test facility to test the engine for the C-5A aircraft arose. The initial action taken by the Air Force was to program a large engine test facility. Three ad hoc working groups of the Aeronautics Panel examined the facilities needed for subsonic and V/STOL aircraft, transonic and supersonic aircraft, and hypersonic aircraft. From the Working Group studies, a first approximation of national facility requirements was provided. The importance of aeronautics on national preeminence, on foreign competition, and the economic impact on the U.S. economy was considered. F.R.L.

A72-41643 Work study in aerospace. L. A. Heese (North American Rockwell Corp., Space Div., Downey, Calif.). *Aeronautical Journal,* vol. 76, July 1972, p. 457-460.

Work study is concerned with the ratio of an established time standard and the time actually spent on a task, this ratio indicating the amount and location of any time waste. The program must include a system of reporting work done and hours spent, of converting this work to standard or earned hours, of comparing the actual to earned hours, and of reporting this ratio to management for decision and action. An actual manufacturing work study program is described. F.R.L.

A72-41935 Experiment design - An organized approach to data collection. K. J. Valentas (General Mills, Inc., Minneapolis, Minn.). *Research Management,* vol. 15, Sept. 1972, p. 58-63.

The questions of determining when sufficient data have been gathered, and the most efficient and accurate way of gathering these data are investigated. The objectives are to screen the variables which are controllable to determine their effect on yield, product quality, and cost in order to identify the important variables, to quantify and understand the system in the light of ever-present experimental error, and to optimize to obtain the best product at the lowest cost. The basis of experiment design is the factorial design. Data interpretation is discussed, and two applications are described. F.R.L.

A72-43244 Air transport planning without plan. W.-D. zu Castell (Münchner Flughafen, Munich, West Germany). *Airport Forum,* Sept. 1972, p. 4-6, 8 (3ff.). In English and German.

Issue is taken by the Munich airport director with the opinions

of two Frankfurt airport executives expressed in an article by Mücke (1971) and another by Apfel (1972), deploring the absence of a Federal German overall 'air traffic concept' that would encompass an integrated transport system and suggesting the future need in Western Europe for only three major intercontinental airport terminals: London, Paris, and Frankfurt. Their position is rejected on the grounds that air transport should be direct, the German transport system is not comparable to those of France and England, the Frankfurt space is overcrowded, and a major intercontinental airport terminal in southern Germany is a necessity. M.V.E.

A72-43442 # **Optimization of the synthesis of radio-electronic equipment (Optimizatsiia sinteza ustroistv radioelektroniki).** V. A. Ignatov. *Radioelektronika,* vol. 15, June 1972, p. 705-711. 7 refs. In Russian.

Description of a method for optimizing the synthesis of electronic equipment at the last phase of a systems approach to design and fabrication. This final stage of development follows after the steps of selecting desired principles of operation, analyzing the method of technical realization for these principles, and determining the dependence of quality criteria on controlled variables. The basis of the method consists of noncanonical singular representation of technical and economical processes by elementary random magnitudes having a demonstrable physical significance. These magnitudes include initial values and deterioration rates for output parameters, planned maintenance schedules, and dependence of wholesale price changes on parameter stability and fabrication tolerances. T.M.

A72-43453 S-3A weight control program. F. Johnson (Lockheed-California Co., Burbank, Calif.). *Society of Aeronautical Weight Engineers, Annual Conference, 31st, Atlanta, Ga., May 22-25, 1972, Paper 906.* 18 p.

Detailed description and critique of the methods employed in the S-3A weight control program. The basic program requirements were an accurate measure of program weight status, complete visibility of the effect of pending changes and a rapid but orderly decision process which considered cost and total program effect. The primary tools employed were target weights controlled to the designer level, weight reduction reviews of each engineering job, vendor weight guarantee clauses, a hierarchy of weight control decision meetings, and cost recognition of each significant weight reduction proposal. Other significant program features were the use of a 'value of the pound,' mandatory weight engineering signature for drawing release, weekly weight and cost status reports, and short span highly intensified programs to cope with special problem areas. Avionics equipment weight was controlled by a program employing avionics engineers as weight specialists. (Author)

A72-43481 An approach to system cost optimization. S. L. Guinn (Boeing Co., Seattle, Wash.). *Society of Aeronautical Weight Engineers, Annual Conference, 31st, Atlanta, Ga., May 22-25, 1972, Paper 941.* 49 p.

The Subsystem Cost Optimization Technique (SCOT), as developed for space system application, provides a tool for the selection of subsystem candidates that yield minimization of total spacecraft plus transportation (boost) cost. The system study of an orbital logistic spacecraft has been selected for presentation of SCOT. The logistic system requirements are discussed together with the baseline spacecraft design, a baseline weight statement, baseline spacecraft costs, aspects of spacecraft weight/cost sensitivity, boost costs, structural concepts, pressure shell candidate costs, thermal protection candidate costs, and some cost optimization results. G.R.

A72-43485 * **Integration of safety engineering into a cost optimized development program.** L. W. Ball (NASA, Marshall Space Flight Center, Safety Office, Huntsville, Ala.). *Society of Aeronautical Weight Engineers, Annual Conference, 31st, Atlanta, Ga., May 22-25, 1972, Paper 945.* 16 p.

A six-segment management model is presented, each segment of which represents a major area in a new product development program. The first segment of the model covers integration of specialist engineers into 'systems requirement definition' or the system engineering documentation process. The second covers preparation of five basic types of 'development program plans.' The third segment covers integration of system requirements, scheduling, and funding of specialist engineering activities into 'work breakdown structures,' 'cost accounts,' and 'work packages.' The fourth covers 'requirement communication' by line organizations. The fifth covers 'performance measurement' based on work package data. The sixth covers 'baseline requirements achievement tracking.' (Author)

A72-43860 Optimal minimax regulation of a dynamic system. M. R. Farese (Bell Telephone Laboratories, Inc., Whippany, N.J.) and H. Kaufman (Rensselaer Polytechnic Institute, Troy, N.Y.). In: Asilomar Conference on Circuits and Systems, 5th, Pacific Grove, Calif., November 8-10, 1971, Record. North Hollywood, Calif., Western Periodicals Co., 1972, p. 193-196. 5 refs.

Optimal regulation of a time-varying dynamic system with unknown, time-varying parameters is considered. Regulation is achieved by finding the control law and parameter vector which minimaximize an appropriate performance function. Numerical algorithms for computing the minimax control law and parameter variations are presented. (Author)

A72-44350 Forecasting as a means for scientific and technological policy control. G. M. Dobrov and L. P. Smirnov (Ukrainian Academy of Sciences, Science Research Dept., Kiev, Ukrainian SSR). *Technological Forecasting and Social Change,* vol. 4, no. 1, 1972, p. 5-18. 6 refs.

Forecasting should be the result of a systematic analysis of trends, and an assessment of the prospects for scientific and technological progress, and the more organically forecasting is connected with planning and decision making, the more successful it is. When they are given forecasts, the bodies directing technological and economic policies can plan for production capacities which will be consistent with hypotheses concerning the future world level of science and technology. This helps to achieve compatibility in the level, character, and possibilities of newly created systems at early stages of their development. These bodies can then exercise a substantial choice of worthwhile trends for further R & D and expediently concentrate necessary efforts and resources. F.R.L.

A72-44356 # **Breaching the Chinese Wall of 100 approvals.** B. A. Schriever. *Astronautics and Aeronautics,* vol. 10, Oct. 1972, p. 57-60.

The genesis of the ICBM program, the major management decisions that were made, and the Atlas, Titan, and Thor programs are discussed. The Atlas, while no longer in the inventory, is still being used in some space flights. In the case of the Titan two-stage missile, separation and ignition in flight were the two big unknowns. The Thor continues as a major booster for the space program. There have been over 400 Thor flights with 99% reliability. F.R.L.

A72-44358 # **Navy within a Navy.** W. F. Raborn. *Astronautics and Aeronautics,* vol. 10, Oct. 1972, p. 63-65.

The autonomous organization which developed the Polaris submarine-weapon system is described. It was built on the concept that a new kind of team combining the Navy and the civilian contractors in a close working relationship would be created. The management technique made it possible to put the first submarine to sea completely equipped with a revolutionary new weapon system in it, operational and on station, within three and a half years. F.R.L.

A72-44576 **The application of operational research to transport problems; Proceedings of the Conference, Sandefjord, Norway, August 14-18, 1972.** Conference sponsored by NATO. North Hollywood, Calif., Western Periodicals Co., 1972. 509 p. $37.50. In English and French.

Structural models of transportation economics, the role of merchant ships in wartime defense missions, and modal split optimization for an intercity transportation system are among the topics covered in papers concerned with the application of operational research to transportation problems. Other areas covered include the role of computers in transport management and planning, future operational research needs in transport, and interplay between civilian and military transport.

Individual items are announced in this issue. M.V.E.

A72-44583 **Applications of operational research in the airline industry.** C. Deetman (KLM - Royal Dutch Airline, Schiphol Airport, Netherlands). In: The application of operational research to transport problems; Proceedings of the Conference, Sandefjord, Norway, August 14-18, 1972. North Hollywood, Calif., Western Periodicals Co., 1972, p. 336-345.

Review of some of the problem areas specific to the airline industry that are suitable for application of operations research (OR) techniques. Successes and failures in the OR experience of a major airline over a period of 15 years are discussed. In particular, the effectiveness requirements of OR as a means of communication between scientists and management are examined and illustrated by concrete examples. M.V.E.

A72-44584 **Airline crew scheduling - A large problem.** B. O'Donald (Eastern Air Lines, Inc., Miami, Fla.) and I. Whiteman. In: The application of operational research to transport problems; Proceedings of the Conference, Sandefjord, Norway, Aug. 14-18, 1972. North Hollywood, Calif., Western Periodicals Co., 1972, p. 357-367.

Discussion of the peculiarities of the airline crew scheduling problem, and review of some heuristic procedures for its solution. Because of the size of its combinatorial space, the problem, recognized to be unwieldy, is broken up into a number of small problems and, through formulation of the appropriate heuristics, is made amenable to a practically manageable solution. M.V.E.

A72-44659 **A customer viewpoint of availability requirements.** A. S. Pollack (U.S. Army, Washington, D.C.). In: Conference on Reliability Testing and Reliability Evaluation, The Hague, Netherlands, September 4-8, 1972, Proceedings. Northridge, California State University, 1972, p. III-C-1 to III-C-12.

Consideration of the requirements intended to provide availability, and discussion of the operational availability approach to equipment acquisition. The activities of the using and procuring agencies must be so coordinated that the procurement agency can intelligently apply its resources to what the using agency really needs. It is shown that the using agency should not ask for any form of intrinsic availability, as this is not what it wants. If the using agency does this, there is a risk of suboptimization, i.e., the result may be unacceptable operational availability, a waste of resources, or both. Intrinsic availability should not be specified contractually for the same reasons. When availability is a significant performance effectiveness criterion to the user, the most desirable approach is to stipulate both operational availability and the availability model (with stated support parameters) to be used for assessment purposes. M.V.E.

A72-44660 **The new approach to reliability data exchange.** E. T. Richards and P. D. Dahl (U.S. Navy, Naval Weapons Station, Seal Beach Corona, Calif.). In: Conference on Reliability Testing and Reliability Evaluation, The Hague, Netherlands, September 4-8, 1972, Proceedings. Northridge, California State University, 1972, p. III-D-1 to III-D-23.

A new approach for the enhancement of the disciplines of reliability, safety, maintainability, and system effectiveness is presented. It utilizes laboratory test and field experience data pertaining to parts/components/materials which are acquired, processed, disseminated and exchanged through the media of two nationally known and recognized voluntary data exchange programs: the Government-Industry Data Exchange Program and the Failure Rate Data Program. The origin and growth of these programs is traced, their organization and operations are described, and the benefits derived are detailed. A potential international linking of these programs with newly developing European reliability programs is discussed. M.V.E.

A72-44663 **Simulation procedure for mission and maintenance planning of an air force wing.** K. B. Brink, T. Conrady, and R. Keppeler (Dornier AG, Friedrichshafen, West Germany). In: Conference on Reliability Testing and Reliability Evaluation, The Hague, Netherlands, September 4-8, 1972, Proceedings. Northridge, California State University, 1972, p. IV-D-1 to IV-D-16.

Outline of a procedure for digital simulation of aircraft mission and maintenance services. The proposed procedure makes it possible to investigate the behavior of a real system subject to changes in its major parameters without interfering with the real-life operations of the system. Each aircraft is traced on its way through its missions. Mission simulation includes checking the aircraft for system or component defects on the basis of specific reliability data. The results of the simulation provide information about availability, utilization, and mission reliability; spare parts requirements; the determination of bottlenecks in the maintenance sequence; and the effectiveness of various maintenance techniques and organizational structures. A.B.K.

A72-44667 **Estimation, confidence intervals, and incentive plans for sequential three way decision procedures.** L. A. Aroian and D. Oksoy (Union College, Schenectady, N.Y.). In: Conference on Reliability Testing and Reliability Evaluation, The Hague, Netherlands, September 4-8, 1972, Proceedings. Northridge, California State University, 1972, p. VI-D-1 to VI-D-13. 6 refs.

Explanation of the use of a three-decision life testing procedure, including a discussion of the testing region, the operating characteristic function, and the median time to termination function. It is shown how to construct and evaluate incentive life tests for a three-decision process, how to estimate the failure rate once a decision has been made, and how to determine confidence intervals for the failure rate after the sequential test. A.B.K.

A72-45171 # ***The effect of space shuttle payload design techniques on total space program cost.*** M. W. Hunter, II. *International Astronautical Federation, International Astronautical Congress, 23rd, Vienna, Austria, Oct. 8-15, 1972, Paper.* 44 p. 7 refs.

Review of space shuttle payload design evolution in terms of the minimization of total shuttle program cost. The topics include a detailed refurbishment analysis, the impact of the payload family derived on the shuttle/tug-system, management cost considerations, mission specifications and objectives, and payload program cost analysis. Total program cost savings are estimated as approaching a billion dollars a year over a 12-year program. V.Z.

A72-45194 * # **NASA's management concept for the Space Shuttle Program.** D. D. Myers (NASA, Washington, D.C.). *International Astronautical Federation, International Astronautical Con-*

gress, 23rd, Vienna, Austria, Oct. 8-15, 1972, Paper. 36 p.

An overview of the Shuttle Program organization and management concepts suggests the necessity of careful measurements of contractor schedules, cost and technical performance, and program modification control to keep both the development and operating cost of the Program at the lowest possible level. Maximum use of the contractors' own management systems and the utilization of new technologies, procedures and materials during space operations are also envisaged as contributors to the reduction of costs per flight to acceptable limits. V.Z.

A72-45210 # **The effect of space shuttle payload design techniques on total space program cost.** M. W. Hunter, II (Lockheed Missiles and Space, Inc., Space Systems Div., Sunnyvale, Calif.). *International Astronautical Federation, International Astronautical Congress, 23rd, Vienna, Austria, Oct. 8-15, 1972, Paper.* 16 p. 7 refs.

An initial preliminary investigation concerning the payload benefits to be gained by using the space shuttle was followed by a study in basically three areas, related to an exploration of several additional detailed designs, a more complete analysis of refurbishment, and an investigation of the effects of standardization on the total space program payload system. The principal results obtained in the study are discussed, giving attention to an increase of the data base, details regarding the modularization of the space program in connection with standardization efforts, program costs, and management considerations. G.R.

A72-45211 # **Cost prediction of space projects.** D. E. Koelle (Messerschmitt-Bölkow-Blohm GmbH, Ottobrunn, West Germany). *International Astronautical Federation, International Astronautical Congress, 23rd, Vienna, Austria, Oct. 8-15, 1972, Paper.* 19 p. 34 refs.

This new effort to develop a space projects cost model is based on a technical and cost analysis of 68 American space projects for the 1958 to 1970 period. The approach is characterized by improvement of formulae by differentiating between development cost and production cost of flight systems, introduction of cost vs mass characteristics for each type of system, use of weight and fabrication rate and/dependent learning factors for flight unit fabrication costs, derivation of technical complexity factors for development cost model which use specific systems dependency criteria, and first analysis and preliminary definition of some major management factors. The cost estimating procedure presented can be used for cost prediction based on the technical concept of a space project was well as for cost analysis of a project in the hardware development phase. A cost prediction accuracy of about 20% can be expected. F.R.L.

A72-45221 # **Employee motivation programs as a means of cost reduction in aerospace industries.** M. R. Sharpe (Alabama Space and Rocket Center, Huntsville, Ala.). *International Astronautical Federation, International Astronautical Congress, 23rd, Vienna, Austria, Oct. 8-15, 1972, Paper.* 17 p. 19 refs.

A72-45295 **The future development of non-destructive testing.** R. S. Sharpe. *Non-Destructive Testing,* vol. 5, Sept. 1972, p. 298-300.

An attempt is made to make a projection of future developments in the field of nondestructive testing, with the emphasis on the need of better confidence in current inspection techniques, a better framework, and better methods of nondestructive test applications. General suggestions are given as to how these objectives might be achieved by a coordinated work of materials scientists. V.Z.

A72-45478 **On the consideration of variability in cost estimating.** K. E. Case (Virginia Polytechnic Institute and State University, Blacksburg, Va.). *IEEE Transactions on Engineering Management,* vol. EM-19, Nov. 1972, p. 114-118. 7 refs.

Engineering companies are frequently requested to submit a fixed-price bid or a ceiling on cost-plus bids. These bids may be subjected to competition or negotiations. In order to determine the bid price, engineering management must first estimate the actual costs to be incurred on the project. The method presented utilizes three estimates for each cost entity considered: a low value, a most likely value, and a high value. From these, estimates of the expected cost and standard deviation of each cost entity and of the entire project are determined. Once the total cost distribution has been determined, statistically sound probabilistic statements may be made about the estimate, ranges of costs which may be incurred, expected profit at a given bid price, probability of losing money, etc. (Author)

A72-45479 **Forecasting costs and completion dates for defense research and development contracts.** A. M. Ruskin (Harvey Mudd College, Claremont, Calif.) and R. Lerner. *IEEE Transactions on Engineering Management,* vol. EM-19, Nov. 1972, p. 128-133. 6 refs.

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STAR ENTRIES

N72-10077*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MEDICAL INFORMATION MANAGEMENT SYSTEM (MIMS): AN AUTOMATED HOSPITAL INFORMATION SYSTEM
Sidney Alterescu, Paul B. Simmons (United Computing Systems, Inc.), and Ronald A. Schwartz (Federal City Coll., Washington, D. C.) Sep. 1971 103 p
(NASA-TM-X-65747; X-751-71-438) Avail: NTIS CSCL 06E

An automated hospital information system that handles all data related to patient-care activities is described. The description is designed to serve as a manual for potential users, nontechnical medical personnel who may use the system. Examples of the system's operation, commentary on the examples, and a complete listing of the system program are included. Author

N72-10186# Mitre Corp., Bedford, Mass.
THE APPLICATION OF MICROPROGRAMMING TECHNOLOGY
Judith A. Clapp May 1971 48 p refs
(Contract F19628-71-C-0002; AF Proj. 6710)
(AD-724718; MTR-2050; ESD-TR-71-105) Avail: NTIS CSCL 09/2

The report surveys promising applications of microprogramming. Emphasis is on the value of microprogramming as a tool which permits computer users to modify the architecture of a general-purpose machine to better match a particular set of requirements. Factors are discussed which affect the choice of microprogramming over hardware and software in the design and implementation of computer-based systems. Actual and potential examples of its application are given to illustrate its relevance to the solution of implementation and performance problems arising in typical Air Force systems. Finally, research and development tasks are proposed which lead to the realization of the benefits of this technology in operational command control and communications systems. Methods are described for integrating the results into existing and future systems in the next several years. Author (GRA)

N72-10988*# Southeastern State Coll., Durant, Okla. Technology Use Studies Center.
TECHNOLOGY UTILIZATION IN A NON-URBAN REGION: FURTHER IMPACT AND TECHNIQUE OF THE TECHNOLOGY USE STUDIES CENTER, 2 Final Report
Henry C. Gold, ed., A. M. Moore, Bill Dodd, and Velma Dittmar May 1971 36 p refs
(Contract NSR-37-004-009)
(NASA-CR-123292) Avail: NTIS CSCL 05B

The clientele served by the Technology Use Studies Center (TUSC) is updated. Manufacturing leads the list of client firms. The standard industrial classification (SIC) range of these firms is broad. Substantial numbers of college and university faculties are using TUSC services. Field operations inherent in the functions of dissemination and assistance are reviewed. Increasing emphasis among clientele is on environmental concerns and management. A record is provided of the institutions contacted and the extent of TUSC involvement with them, as well as TUSC's cooperation with agencies and organizations. The impact of TUSC and the NASA-sponsored Technology Utilization Program on other public agencies is discussed. Author

N72-10991# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
PERSONNEL MANAGEMENT: HUMAN RESOURCES RESEARCH
James L. Quinn Mar. 1971 103 p refs
(AD-727030; SLTR-3-71) Avail: NTIS CSCL 05/9

Human resources have long been recognized as the most important asset of any organization. The potential value to be gained from a better understanding of the human processes and an application of this knowledge to the improved utilization of manpower resources within the organizational environment has led to a vast amount of human resources research within recent years. The report addresses aspects of personnel research relating primarily to the study of job factors within the work setting itself, as well as discussing the factors underlying human relationships and with the information technology facilitating these interrelationships within the organization. It offers an integrative, systems approach to manpower management, describing how the research and information subsystem of the manpower management system can significantly contribute to utilization of the human resources employed in attaining organizational objectives. Author (GRA)

N72-11199# Vanderbilt Univ., Nashville, Tenn.
A MAN-MACHINE APPROACH TOWARD SOLVING VARIOUS ROUTING, SCHEDULING, AND NETWORK PROBLEMS
Patrick Krolak, Wayne Felts, and James M. Nelson *In* AGARD Artificial Intelligence Sep. 1971 12 p refs

(Grant NSF GK-4975)
Avail: NTIS HC $6.00/MF $0.95

A man-machine approach is presented for solving problems of the following types: traveling salesman, generalized truck dispatching, board wiring, and construction of minimum cost communication networks with survival or redundancy demands. The truck dispatching problem is considered in detail, and the man-machine process, data organization, computer heuristics, and the interactive phase are discussed. F.O.S.

N72-11393# Technische Hochschule Carolo Wilhelmina, Brunswick (West Germany).
SCHEDULES AND LOT SIZES IN SERIES MANUFACTURING STUDIED BY A PRACTICAL SIMULATION MODEL Ph.D. Thesis [REIHENFOLGEN UND LOSGROESSEN IN DER SERIENFERTIGUNG UNTERSUCHT AN EINEM PRAXISBEZOGENEN SIMULATIONSMODELL]
Axel J. Papendieck 1971 152 p refs In GERMAN
Avail: NTIS

Simulation models for scheduling and lot size in multiple step series production show that the use of priority rules does not affect developing costs. Planning methods produce only in very limited situations good results when high value lots are processed rapidly through production. The latter process is only recommended when the additional administrative effort remains reasonable. Simulation of optimal lot size shows that work with smaller lots is most advantageous. Minimal expenses occur with lot sizes between half and whole Adler values in relation to the cost value of the product. Minimal cost effectiveness is found approximately at a capacity limit represented in 100% occupation of a working group; exceeding this limitation produces rapidly increasing costs and organizational difficulties. Transl. by G.G.

N72-11847*# National Aeronautics and Space Administration, Washington, D.C.
RESEARCH AND TECHNOLOGY OPERATING PLAN SUMMARY, FISCAL YEAR 1972 RESEARCH AND TECHNOLOGY PROGRAM
[1971] 393 p
(NASA-TM-X-67393) Avail: NTIS HC $6.00/MF $0.95 CSCL 05B

The NASA Research and Technology program for FY 1972 is presented. It is a compilation of the summary portions of each of the RTOPs (Research and Technology Operating Plan) used for management review and control of research currently in progress throughout NASA. The RTOP Summary is designed to facilitate communication and coordination among concerned technical personnel in government, in industry, and in universities. Author

N72-11849# RAND Corp., Santa Monica, Calif.
PROCEEDINGS OF A CONFERENCE ON REGIONAL TRANSPORTATION PLANNING
Joseph S. Desalvo, ed. May 1971 526 p refs Conf. held at Santa Monica, Calif., 25-27 Jan. 1971
(Contract DOT-OS-00074)
(PB-200076; R-706-DOT; DOT-OS-00074) Avail: NTIS HC $6.00/MF $0.95 CSCL 13B

The conference explored the idea that some form of transportation planning entity should be created between two existing levels of planning-the national level and individual states or smaller jurisdictions. The issue was to consider the advantages and disadvantages, in economic and administrative terms, of conducting transportation planning on a regional basis. Author (GRA)

N72-12515*# Denver Research Inst., Colo. Industrial Economics Div.
APPLICATIONS OF AEROSPACE TECHNOLOGY IN INDUSTRY, A TECHNOLOGY TRANSFER PROFILE: PLASTICS
Jul. 1971 77 p refs
(Contract NSR-06-004-063)
(NASA-CR-123419) Avail: NTIS CSCL 11I

New plastics technology bred out of the space program has moved steadily into the U.S. economy in a variety of organized and deliberate ways. Examples are presented of the transfer of plastics know-how into the plants and eventually the products of American business. A.L.

N72-12963*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
METHODOLOGIES FOR OPTIMAL RESOURCE ALLOCATION TO THE NATIONAL SPACE PROGRAM AND NEW SPACE UTILIZATIONS. VOLUME 1: TECHNICAL DESCRIPTION Final Report
19 Nov. 1971 110 p refs
(Contract NAS2-5202)
(NASA-CR-114380) Avail: NTIS CSCL 22A

The optimal allocation of resources to the national space program over an extended time period requires the solution of a large combinatorial problem in which the program elements are interdependent. The computer model uses an accelerated search technique to solve this problem. The model contains a large number of options selectable by the user to provide flexible input and a broad range of output for use in sensitivity analyses of all entering elements. Examples of these options are budget smoothing under varied appropriation levels, entry of inflation and discount effects, and probabilistic output which provides quantified degrees of certainty that program costs will remain within planned budget. Criteria and related analytic procedures were established for identifying potential new space program directions. Used in combination with the optimal resource allocation model, new space applications can be analyzed in realistic perspective, including the advantage gain from existing space program plant and on-going programs such as the space transportation system. Author

N72-12964*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
METHODOLOGIES FOR OPTIMAL RESOURCE ALLOCATION TO THE NATIONAL SPACE PROGRAM AND NEW SPACE UTILIZATIONS. VOLUME 2: RESOURCE ALLOCATION AND SMOOTHING MODEL, PROGRAMMER'S MANUAL Final Report
19 Nov. 1971 190 p refs
(Contract NAS2-5202)
(NASA-CR-114381) Avail: NTIS CSCL 22A

Appendixes are presented that provide model input requirements, a sample case, flow charts, and a program listing. At the beginning of each appendix, descriptive details and technical comments are provided to indicate any special instructions applicable to the use of that appendix. In addition, the program listing includes comment cards that state the purpose of each subroutine in the complete program and describe operations performed within that subroutine. The input requirements includes details on the many options that adapt the program to the specific needs of the analyst for a particular problem. Author

N72-12965# National Academy of Sciences-National Research Council, Washington, D.C.
UNITED STATES SPACE SCIENCE PROGRAM
1971 160 p refs Presented at the 14th COSPAR meeting, Seattle, Jun. 1971
Avail: NTIS

This report on the United States space program is compiled from the contributions of many organizations and individuals. It includes summaries of observations from spacecraft, sounding rockets, high-altitude balloons and in some cases, aircraft, that were made during 1970 or reported in 1970, and it briefly discusses flights planned for 1971. Laboratory work and ground-based observations are not reported unless they specifically relate to a particular flight experiment or program. In addition to the accounts on space research, grouped under the relevant scientific disciplines, three chapters contain information on technological development, cooperative international activities, and organizational changes bearing on space research during the year. Author

N72-12969# Federal Aviation Administration, Washington, D.C.
THIRD ANNUAL NATIONAL AVIATION SYSTEM PLANNING REVIEW CONFERENCE
1971 74 p refs Conf. held 26-29 Apr. 1971
(WRCNM-2; FOF-0(Minimum)) Avail: NTIS

Summaries of the lectures presented at the annual forum are presented along with summaries of the group discussions. The sessions reported include: plenary session, capital equipment priorities and investments, man in the system, systems engineering management, research and development, and short haul transportation. F.O.S.

N72-13053*# Michigan Univ., Ann Arbor. Research Center for Group Dynamics.
ORGANIZATIONAL STRESS AND INDIVIDUAL STRAIN: A SOCIAL-PSYCHOLOGICAL STUDY OF RISK FACTORS IN CORONARY HEART DISEASE AMONG ADMINISTRATORS, ENGINEERS, AND SCIENTISTS Cumulative Progress Report, 1 Jul. 1969 - 30 Jun. 1970
Robert Dennis Caplan Nov. 1971 691 p refs
(Grant NGR-23-005-185)
(NASA-CR-125217) Avail: NTIS HC $9.00/MF $0.95 CSCL 06S

It is hypothesized that organizational stresses, such as high quantitative work load, responsibility for persons, poor relations with role senders, and contact with alien organizational territories, may be associated with high levels of psychological and physiological strain which are risk factors in coronary heart disease. It is further hypothesized that persons with coronary-prone Type A personality characteristics are most likely to exhibit strain under conditions of organizational stress. Measures of these stresses, personality traits, and strains were obtained from 205 male NASA administrators, engineers, and scientists. Type A personality measures included sense of time urgency, persistence, involved striving, leadership, and preference for competitive and environmentally overburdening situations.
Author

N72-13196# Naval Postgraduate School, Monterey, Calif.
TIME SHARED COMPUTER PROGRAMS FOR OFFICER STRUCTURE POLICY PLANNING M.S. Thesis
Frank William Reifsynder, Jr. Jun. 1971 63 p refs
(AD-728697) Avail: NTIS CSCL 05/9

The thesis develops two personnel flow models which can aid the manpower policy planner to predict future officer structures through the use of a time-shared computer system. The underlying structure is presented for both models. One model considers promotions based on length of commissioned service. The other model considers promotions based on length of time in grade. Computer programs are developed for both models and sample outputs are shown. The programs are used on a time-shared computer system so that the policy planner can interact with the computer with a minimal knowledge of computer programming. The computer output is in a concise, easy to understand form. Author (GRA)

N72-13931# Department of Transportation, Washington, D.C.
EXECUTIVE BRANCH CRITERIA FOR DOMESTIC AIRLINE MERGER PROPOSALS
31 Aug. 1971 8 p
Avail: NTIS

Airline merger agreements should take into account the following criteria: A merger should not result in either the elimination of effective competition, or an excessive market share for the surviving firm; undue concentration within the air carrier industry; defense merger proposals by competitive carriers; substantial foreclosure of competition for interchange traffic or other excessive injury to other carriers; substantial operational, service, or organizational benefits for the surviving firm; and corrective benefits of the surviving firm towards the original difficulty of the weaker merger partner. Author

N72-13988# Department of Transportation, Washington, D.C. Office of Supersonic Transport Development.
AN ANALYSIS OF THE UNITED STATES AEROSPACE AND AIR TRANSPORT INDUSTRIES
17 Mar. 1971 76 p refs
Avail: NTIS

It is stipulated that aerospace and air transport industries are essential to the U.S. economy because they provide the bulwark of the national defense, are the largest single employer, and the backbone of the passenger common carriage system. It is in the public interest for the United States to sponsor research and programs which will keep the U.S. in the forefront of high technology fields and maintain its leadership position on the world market. Aerospace production decrease can result in increased unemployment and reliance on foreign imports. G.G.

N72-14096# Office of the Surgeon General (Air Force), Washington, D.C.
CAUSES FOR MEDICAL GROUNDING OF PILOTS AND NAVIGATORS IN THE UNITED STATES AIR FORCE, 1969
Robert A. Farmer and Howard R. Unger *In* AGARD Clinical Causes for Grounding Nov. 1971 6 p

Avail: NTIS

Specific indices and measures of the health of USAF-rated officers are computed from biometric data provided by the flight surgeon's medical recommendations. These data are discussed in relation to the health of Air Force flyers and the practice of aerospace medicine in the U.S. Air Force. Similarities and variations of medical practice and management are considered. Comparisons of the rates of removal and noneffective ratios by rating, age, and command are presented. Author

N72-14130# Naval Aerospace Medical Research Lab., Pensacola, Fla.
EARLY APTITUDE-ACHIEVEMENT DISCREPANCIES AS PREDICTORS OF LATER VOLUNTARY WITHDRAWAL FROM NAVAL AVIATION TRAINING
Richard E. Doll 7 Jun. 1971 10 p refs
(AD-728389; NAMRL-1134; NAVMED-MF 12.524.002-5013D)
Avail: NTIS CSCL 05/9

During recent years there has been a marked increase in the drop-on-request (DOR) rate among aviation officer candidates (AOC's). This type of attrition has been exceedingly difficult to predict because of a lack of good measures of motivation. This study examines the hypothesis that any substantial discrepancy between aptitude and achievement may well be a product of motivation and that scores based on such discrepancies may be useful in identifying potential DOR's. Quadrant analysis of two independent samples showed the high aptitude-low achievement quadrant to have a higher DOR rate than any other quadrant. It is recommended that this type of analysis be incorporated as a secondary selection tool upon completion of the environmental indoctrination stage of training. Author (GRA)

N72-14230# Army Behavior and Systems Research Lab., Arlington, Va.
EVALUATION OF MAN-COMPUTER INPUT TECHNIQUES FOR MILITARY INFORMATION SYSTEMS
Michael H. Strub May 1971 34 p refs
(DA Proj. 2Q0-24701-A-723)
(AD-730315; BESRL-TRN-226) Avail: NTIS CSCL 09/2

The publication describes the evaluation, in terms of speed and accuracy, of four configurations of procedures for inputting information into a semi-automated information processing system. Sixty USMA Prep School enlisted men were given an experimental task requiring each to translate 35 free-text messages into computer-acceptable terminology. Accuracy and speed of two input procedures were each compared under two conditions of verification. In one procedure, the subjects translated the incoming message onto a paper format before transcribing on a CRT screen (off-line). In the other procedure, the message was transcribed directly on the CRT screen (on-line). In the unverified condition, one man performed the input operation without error check; in the verified condition, two men translated the same message, compared their translations, and resolved differences before entering the information into the data base. Performance results under the four experimental conditions were also compared with a similar 7th Army TOS procedure in which a message is translated onto a paper format and the unverified message is copied on the CRT screen by the UIOD (user input-output device) operator. Author (GRA)

N72-14970*# National Aeronautics and Space Administration, Washington, D.C.
ESTIMATING THE REDUNDANCY OF INFORMATION IN INDUSTRIAL SAMPLING AND INFORMATION TRANSMISSION SYSTEMS
A. B. Markhasin Sep. 1971 8 p refs Transl. into ENGLISH in "Otsenki Izpytochnosti Soobshcheniy v Promyshlennykh Sistemakh Otbora i Peredachi Informatsii" in "Chetvery Simpozium po

Probleme Izbytochnosti v Informatsionnykh Sistemakh" Leningrad. Acad. of Sci. /USSR/, 1970 p 454-460
(NASA-TT-F-13875) Avail: NTIS CSCL 05B

Proposed is a method of estimating the redundancy of informational sources which can be modeled by the sum of a large number of Markov sequences with infrequent transitions. The proposed method is based on the clustering of the resultant sequence's transition probabilities with respect to the characteristic K, which is the number of sequences in which transitions have occurred. The method is also based on calculation of estimates of the redundancy as a function of the probability distribution of the number K or its moments. A theorem is proven which establishes that the air in the redundancy estimate asymptotically tends to zero. It is shown that the redundancy is caused primarily by the nonuniformity in the distribution in the number K for the class of information sources being investigated. Author

N72-14971*# Denver Research Inst., Colo.
AEROSPACE MANAGEMENT TECHNIQUES: COMMERCIAL AND GOVERNMENTAL APPLICATIONS
J. Gordon Milliken and Edward J. Morrison Nov. 1971 221 p refs
(Contract NSR-06-004-081)
(NASA-CR-124728) Avail: NTIS CSCL 05D

A guidebook for managers and administrators is presented as a source of useful information on new management methods in business, industry, and government. The major topics discussed include: actual and potential applications of aerospace management techniques to commercial and governmental organizations; aerospace management techniques and their use within the aerospace sector; and the aerospace sector's application of innovative management techniques. F.O.S.

N72-14974# Commission of the European Communities, Brussels (Belgium).
THE AERONAUTICAL AND SPACE INDUSTRIES OF THE COMMUNITY COMPARED WITH THOSE OF THE UNITED KINGDOM AND THE UNITED STATES. VOLUME 2: THE AERONAUTICAL AND SPACE INDUSTRY
1971 192 p refs 5 Vol.
(Rept-7042-Vol-2) Avail: NTIS

The process of production, changes in aerospace firms, and changes in the economic characteristics of the aerospace industry are analyzed for the European Economic Community, the United Kingdom, and the United States. It is concluded that the European and British aerospace firms are not big enough to have optimum production runs and their smallness prevents the concentration of technical investments and adoption of new methods of organization of the U.S. industry. The U.S. figures for value of output per head and productivity per head are almost twice those for the EEC and three times those for the U.K. Profits as percentage of own capital for 1966 were 3.80% for France, 5.34% for the U.K., and 15.8% for the U.S., and the annual rate of turnover of total net assets was 0.56 for France, 1.12 for the U.K., and 2.1 for the U.S. It is felt that the structural and operational shortcomings in the European aerospace industry are the result of the inability of the industry, and of the public authorities concerned with it, to program and carry through the production of optimum production runs. N.E.N.

N72-14977# Commission of the European Communities, Brussels (Belgium).
THE AERONAUTICAL AND SPACE INDUSTRIES OF THE COMMUNITY COMPARED WITH THOSE OF THE UNITED KINGDOM AND THE UNITED STATES. VOLUME 5: TECHNOLOGY: BALANCE OF PAYMENTS, THE ROLE OF THE AEROSPACE INDUSTRY IN THE ECONOMY, CRITICAL ASSESSMENT OF THE RESULTS OF THE SURVEY
1971 88 p refs 5 Vol.
(Rept-7042-Vol-5) Avail: NTIS

Holdings of United States companies in European firms, and of European firms in other European companies are described, and the share of technical and financial exchanges in the European Economic Community aerospace industries is summarized. The areas most affected by spinoffs from the aerospace industry are described, based on the United States experiences. The technical areas are medicine and biology, electronics and electricity, mechanical engineering and materials, chemicals and propulsive systems, and management techniques which may be the most significant spinoff. The most significant aspect of the economic fallout is considered to be the transfer of aerospace technology, at management level, to the solution of important social and economic problems of contemporary society. The influence of the aerospace industry on the economic cycle is illustrated. A critical assessment is made of the EEC aerospace industry's output, markets, and structural problems, and changes in organization and relations with the U.K. industry are suggested. N.E.N.

N72-15107# RAND Corp., Santa Monica, Calif.
PILOT MANAGEMENT POLICY AND PILOT TRAINING RATES
W. A. Stewart Mar. 1971 109 p refs
(Contract F44620-67-C-0045)
(AD-729760; R-690-RR) Avail: NTIS CSCL 05/9

A study was made of the effects of lengthening the initial cockpit flying time for Air Force pilots. Changing the number of operational flying years required of career pilots, the number of years required of all pilots in their initial cockpit tours, and the timing of career rotation from cockpit to nonflying duty will change the number and cost of new pilots to be trained. Criteria by which the author assesses alternative pilot management policies include pilot quality, cost, career development, mobilization potential, acceptability, and replacement training rate--the number per thousand man-years at which new pilots must be trained to supply a given number of operational cockpit man-years. Lengthening initial cockpit tours could reduce training programs and initial training costs, improve quality, reduce recurrent advanced-pilot-training costs, and provide career pilots more time away from operational flying. Author (GRA)

N72-15225 E-A Space and Advanced Military Systems, Ltd., Camberley (England).
ANALYSIS OF LARGE NETWORKS
1 Feb. 1971 41 p
(Appl-Note-2-Ser-1) Copyright. Avail: Issuing Activity

Techniques for organizing networks of information for computer processing are described. Two basic methods, high level activities and key events, are involved in the process. The limitations imposed on the network by the program and the facilities available for data processing are discussed. Examples of data summarization prior to computer processing are presented. Author

N72-15556# Technische Univ., Berlin (West Germany).
STRUCTURE AND SEQUENTIAL ORGANIZATION OF OPTIMAL SUPPLY BY THEORY OF FINITE GRAPHS Ph.D. Thesis [AUFBAU- UND ABLAUFORGANISATORISCHE LAGEROPTIMIERUNG MITTELS DER THEORIE ENDLICHER GRAPHEN]
Eberhard Schult 1970 62 p refs In GERMAN
Avail: NTIS

An optimal organizational algorithm is formulated that considers transportation methods which also include unsteady transportation sequences. Specific demands of supply organizations are expressed in points (supply locations) and line systems (transportation routes) on organizational diagrams. An organizational sequencing model with or without capacity limitations is used to optimize transportation coordination between various internal production regions at minimal costs. Transl. by G.G.

N72-15566# Texas Univ., Austin. Center for Cybernetic Studies.
AN ALGORITHM FOR SEPARABLE PIECEWISE CONVEX PROGRAMMING PROBLEMS
Richard M. Soland Aug. 1971 35 p refs
(Contracts N00014-67-A-0126-0008; N00014-67-A-0126-0009; NR Proj. 047-021)
(AD-730755; CS-60) Avail: NTIS CSCL 12/2

A branch and bound algorithm is presented to solve mathematical programming problems of the form: Find x = (x sub 1,...,x sub n) to minimize the summation of phi(sub io)(x sub i) subject to x belongs to G, l < or = x < or = L, and the summation of phi(sub ij)(x sub i) < or = 0, j = 1,...,m. With l = (l sub 1,...,l sub n) and L = (L sub 1,...,L sub n), each phi(sub ij) is assumed to be lower semicontinuous and piecewise convex on the finite interval (l sub i)(L sub i). The G is assumed to be a closed convex set. The algorithm solves a finite sequence of convex programming problems; these correspond to successive partitions of the set C = the set (x/l < or = x <, or = L) on the basis of the piecewise convexity of the problem functions phi(sub i). Computational considerations are discussed, and an illustrative example is presented. Author (GRA)

N72-15611# Argonne National Lab., Ill. Center for Educational Affairs.
ARGONNE SAFEGUARDS TRAINING PROGRAM: A THREE YEAR HISTORY
Manuel A. Kanter 1971 8 p Presented at the 12th Ann. Meeting of the Nucl. Mat. Management, West Palm Beach, Fla., 29 Jun. 1971 Sponsored by AEC
(Conf-710617-11) Avail: NTIS

During its first three years of operation, the Argonne Safeguards Training Program has offered training in nuclear materials safeguards to over 200 participants from government and industry both foreign and domestic. Its offerings have ranged from a basic course intended for those who are new to the field to specialized workshops for the experienced practitioners. In addition a beginning was made in the teaching of safeguards and nuclear materials control in existing institutions of higher learning. Developing trends will be assessed as to their effect on future training programs. Author (NSA)

N72-15744*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif. Space Station Program
INTEGRATED MISSION MANAGEMENT OPERATIONS
Nov. 1971 561 p
(Contract NAS8-25140)
(NASA-CR-121076; MDC-G2600) Avail: NTIS HC $6.00/MF $0.95 CSCL 22A

Operations required to launch a modular space station and to provides sustaining ground operations for support of that orbiting station throughout its 10 year mission are studied. A baseline, incrementally manned program and attendent experiment program options are derived. In addition, features of the program that significantly effect initial development and early operating costs are identified, and their impact on the program is assessed. A preliminary design of the approved modular space station configuration is formulated. Author

N72-15928*# Denver Research Inst., Colo. Industrial Economics Div.
PROJECT FOR THE ANALYSIS OF TECHNOLOGY TRANSFER Semiannual Report, 1 Jan. - 30 Jun. 1971
James P. Kottenstette, James E. Freeman, and Eileen R. Staskin Oct. 1971 97 p
(Contract NSR-06-004-063)
(NASA-CR-125399) Avail: NTIS CSCL 05B

The special task of preparing technology transfer profiles during the first six months of 1971 produced two major results: refining a new method for identifying and describing technology transfer activities, and generating practical insights into a number of issues associated with transfer programs. Author

N72-15930*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CARRIER ACCOUNT UTILIZATION AT THE GODDARD SPACE FLIGHT CENTER
W. E. Mathis and J. T. Langmead Jan. 1972 53 p
(NASA-TM-X-65793; X-210-71-490) Avail: NTIS CSCL 05A

The system in use at Goddard Space Flight Center for the utilization of the Common Use Service Carrier Account and the R&D Inventory Carrier Account technique for budgeting, accounting, financial control, and management reporting, both for the individual functional area and on a Center-wide basis, is documented. Author

N72-16173# Joint Publications Research Service, Washington, D.C.
CYBERNETICS AND CONTROL THEORY
17 Dec. 1971 27 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 200, no. 5-6, 1971
(JPRS-54729) Avail: NTIS

The application of control theory for optimization of planning and scheduling systems is demonstrated.

N72-16175# Joint Publications Research Service, Washington, D.C.
OPTIMIZATION IN THE THEORY OF MACHINES, USING THE LP-SEARCH METHOD
I. I. Artobolevskiy, M. D. Genkin, V. K. Grinkevich, I. M. Sobol, and R. B. Statnikov *In its* Cybernetics and Control Theory 17 Dec. 1971 p 7-11 refs
(UDC-518.1) Avail: NTIS

A statistical local search model is proposed as a nondimensional analog to the concepts machine, mechanism, design, etc. Optimum planning in series production and design of experiments includes both a search for a design plan according to given criteria and the formulation of a mathematical search analog. G.G.

N72-16910 Teledyne Brown Engineering, Huntsville, Ala.
A DISCUSSION ON THE ANALYTICAL DYNAMICS, STRESS, AND DESIGN INTERFACES
Irvin P. Vatz *In* Shock and Vibration Inform. Center (Defense) The Shock and Vibration Bull., no. 41, pt. 6 Dec. 1970 p 179-186 refs
Avail: Director, Navy Publ. and Printing Serv. Office, Naval District of Washington, Bldg. 157-2, Washington Navy Yard, Washington, D. C. 20390; $15.00/set

The structural analysis work flow path for typical organizations is reviewed. Present practices are evaluated relative to future requirements. Discussed are: (1) effect of the analytical outputs on the efficiency of the design process; (2) effect of the analytical process on the efficiency of the finalized design; (3) ideal interface between dynamics analysis and stress analysis; (4) efficient use of dynamics analysis inputs by stress analysts; (5) meaning of structural design reliability; (6) cumulative history effect on the life of structures; (7) influence of all factors in determining the static equivalent of the dynamic load. Author

N72-16957# Committee on Science and Astronautics (U. S. House).
INTERNATIONAL SCIENCE POLICY Compilation of Conference Papers
Washington GPO Feb. 1971 162 p refs Papers presented at the 12th Meeting of the Panel on Sci. and Technol. with the Comm. on Sci. and Technol., Washington, D. C., 1971. Compilation presented to Congr., Feb. 1971
Avail: NTIS; SOD $0.75

Conference papers presented to the Committee on Science and Astronautics consider the utilization of science and technology to solve today's critical national and international problems. Global formulation of a science policy and international

management and application of scientific research to stop environmental pollution, improve the economics of developing countries, enhance the benefits of technology and to curb its dangers are the main topics.

N72-16959# International Centre for Theoretical Physics, Trieste (Italy).
INTERNATIONAL COOPERATION IN THE PHYSICAL SCIENCES
Abdus Salam *In* Comm. on Sci. and Astronaut. Intern. Sci. Policy Feb. 1971 p 35-49
Avail: NTIS; SOD $0.75

The need for international collaboration is outlined in order to secure the optimal use of research in physical sciences and to use existing science for the benefit of developing humanity. The setting of a world science policy, the establishing of science foundations and world universities, and a strengthening of U.N. agencies dealing with sciences are all essential for scientific collaboration. G.G.

N72-16960# International Council of Scientific Unions, Rome (Italy).
NEW MECHANISMS FOR SCIENTIFIC COOPERATION IN THE FUTURE
Viktor A. Ambartsumian *In* Comm. on Sci. and Astronaut. Intern. Sci. Policy Feb. 1971 p 51-60

Avail: NTIS; SOD $0.75

Problems of international scientific cooperation between the different countries are diverse. The possibility and feasibility of a world information system is considered. The implementation of scientific, multilateral, and international cooperation is the aim of all scientific organizations in order to complement each other in the various fields of scientific research. G.G.

N72-16962# Gulf and Western Precision Engineering Co., Manchester, Conn.
NATIONAL SCIENCE POLICY, PRELUDE TO GLOBAL COOPERATION
Emilio Q. Daddario *In* Comm. on Sci. and Astronaut. Intern. Sci. Policy , Feb. 1971 p 73-80
Avail: NTIS; SOD $0.75

A new policy formulation is required that incorporates new approaches and mechanisms for broader scientific international cooperation. Science and scientist must be more responsive to the needs of society and develop a more multilateral approach to scientific cooperation. It is suggested that more developed nations formulate a unified policy that serves the goals of a specific community of nations which are then implemented by an International Science Policy Committee. The latter thus provides an important means for the exchange of information and directs aid policies of its individual members. G.G.

N72-16963# National Academy of Public Administration, Washington, D.C.
ADMINISTRATIVE REQUIREMENTS FOR ADVANCING INTERNATIONAL SCIENCE POLICY
James E. Webb *In* Comm. on Sci. and Astronaut. Intern. Sci. Policy Feb. 1971 p 81-90 ref
Avail: NTIS; SOD $0.75

Practical ways are considered through which an international science policy can be made effective. Advocated are forms of organization and administration and forms of policy evolution that bring the substance of scientific and technical projects into close working relationships with effective public management. An Academy of Public Administration is projected as a necessary interface between scientific knowledge, engineering knowhow, the community of scientists and technologists and the environment in which these forces do their work. G.G.

N72-16964# International Centre of Insect Physiology and Ecology, Nairobi (Kenya).
INTERNATIONAL COOPERATION IN THE SOCIAL AND LIFE SCIENCES
Thomas R. Odhiambo (Nairobi Univ.) *In* Comm. on Sci. and Astronaut. Intern. Sci. Policy Feb. 1971 p 91-109 ref

Avail: NTIS; SOD $0.75

The problems and new mechanisms of international scientific cooperation in the life sciences are considered from the point of view of the developing countries, and especially Africa. Science and technology are regarded as major factors in advancing developing countries. Mechanisms of international cooperation to achieve desirable social objectives are: printed materials, scientific seminars, wandering scholars, patenting and selling of knowhow, and especially concentrated research centers and universities where fundamental research is carried out with a definite practical goal sharply in focus. G.G.

N72-16965# Steering Committee on Science Policy (Canadian Senate), Ottawa.
THE LEGISLATIVE ROLE IN SCIENCE POLICY
Allister Grosart *In* Comm. on Sci. and Astronaut Intern. Sci. Policy Feb. 1971 p 111-121
Avail: NTIS; SOD $0.75

The organization of an international Parliamentary Science Association is advocated that is able to make scientific and budgetary contributions to the problems of high seas and ocean floors, disarmament, satellites, population, food, and the transfer of scientific and technological resources from the affluent to the developing countries. G.G.

N72-16966# National Academy of Sciences-National Research Council, Washington, D.C.
SCIENCE, TECHNOLOGY AND THE DEVELOPING COUNTRIES
Harrison S. Brown *In* Comm. on Sci. and Astronaut. Intern. Sci. Policy Feb. 1971 p 123-132
Avail: NTIS; SOD $0.75

Rapid economic development of the poor countries is essential to prevent social unrest and the eruption of wars. Expanded transfer of capital from the rich countries to the poor is essential for accelerated development and requires adequate organizational structures and technically trained persons. A number of bilaterial programs with organizations in developing countries are aimed at strengthening their local scientific-technological problem-solving competence. The creation of an International Development Institute is projected that can accelerate the development processes. G.G.

N72-16967# Stockholm School of Economics (Sweden).
THE ROLE OF SCIENCE POLICY IN SOLVING SOCIAL PROBLEMS
Staffan Burenstam Linder *In* Comm. on Sci. and Astronaut. Intern. Sci. Policy Feb. 1971 p 133-141

Avail: NTIS; SOD $0.75

A science policy in a form which prevents social strain is required to prevent reactions against science and technology that may completely change the direction and position of our civilization. The problem of unbalanced progress in economic growth built on the results of science and technology manifests itself in fear and defeatism, inability to adjust to the demands of new technology, new types of poverty caused by economic growth that leads to partial affluence, a scarcity of natural resources, and the uneven geographic spread of the benefits of modern science and technology. An international science policy is required to correct these unbalances and to solve the problems that the application of science has caused by adoption of a cautious, but well financed program of technological development. G.G.

N72-16968# Centre d'Etudes Marines Avancees, Marseilles (France).
INTERNATIONAL SCIENCE POLICY IN THE MARINE ENVIRONMENT
Jacques Yves Cousteau *In* Comm. on Sci. and Astronaut. Intern. Sci. Policy Feb. 1971 p 143-148

Avail: NTIS; SOD $0.75

A program of action on an international basis is outlined to stop the environmental pollution of oceans and their decrease in populations and vitality. Required is a 20% increase of money allocations to the sciences of environmental pollution, education of the public consumer to influence the producer, and persuasion of polluters that profits can be made through increased business volumes that result from the fight against pollution. Since the biggest polluters are the nations with the highest income per capita, it is proposed that Japan, North America, Europe, and Russia get together to adopt a policy that will immediately bring down pollution by about 80 percent. G.G.

N72-16970# Loughborough Univ. of Technology (England). Dept. of Transport Technology.
A COMBINED CONCEPTUAL/DATA BASED METHODOLOGY FOR THE DETERMINATION OF UNIVERSITY DEPARTMENTAL ACADEMIC, SUPPORTING AND ADMINISTRATIVE STAFF AT AN INTERNATIONAL LEVEL OF APPLICATION
Keith Legg Oct. 1971 67 p refs
(TT-71-09) Avail: NTIS

A generalized methodology is presented for calculating university departmental academic, supporting, and administrative staff for various subject classifications and geographical regions. Emphasis is placed on flexibility to accommodate different types of programs and parametric data are presented to facilitate numerical assessment. The complete method is illustrated by application to a typical United Kingdom university. The work is primarily intended for interdepartmental distribution analysis, but it can also be used in aggregated form for overall university resource model analysis. Author

N72-16972# Joint Publications Research Service, Washington, D.C.
THE CONTEMPORARY STAGE OF THE SCIENTIFIC AND TECHNICAL REVOLUTION AND SOCIAL PLANNING
Z. I. Faynberg *In its* Readings in Soviet Cybernetics and Sociology 19 Jan. 1972 p 1-15 refs

Avail: NTIS

The necessity of social planning in a socialist society and its specific problems are briefly analyzed. Social planning is also related to economic planning and the division between them is determined. The basic link of social planning, efficiency of creative labor, significance of material incentive, general growth of material well-being, social advancement and motivation of labor, shifts in the relationship between managers and laborers, economic planning of production and distribution of goods, and relations between an industrial enterprise and all aspects of the society are discussed. N.E.N.

N72-16978# Royal Aircraft Establishment, Farnborough (England).
PRINCIPLES OF LONG-TERM PLANNING OF SPACE ACTIVITIES
Jun. 1971 18 p refs Transl. into ENGLISH of "Bases para una Planificacion a Largo Plazo en Actividades Espaciales", Comision Nacl. de Invest. Espaciales, Argentina, report
(RAE-Lib-Trans-1568; BR-27732; UDC-629.19(82)) Avail: NTIS

Details of the chief aims for space research in the Argentine are given. Each of the main headings is then sub-divided into its chief components and the estimated cost of each main aim is given. The first appendix shows, in detail, how the CNIE can fit into these plans by promoting space activities and the construction of vehicles and suitable launching bases as well as in the training of suitable personnel and cooperation with similar organisations in other countries. In the second appendix the cost of vehicle launching is considered in respect of the benefits to be obtained and it is considered that the Argentine should have its own launching facilities in 8 to 10 years. Author

N72-16987# European Space Research and Technology Center, Noordwijk (Netherlands).
DEVELOPMENT AND IMPLEMENTATION OF PROJECT MANAGEMENT INFORMATION SYSTEMS (PMIS)
Hellmuth Gehriger 16 Jun. 1971 57 p Presented at the Intern. Expert Seminar on Pract. Appl. of Proj. Network Tech. (INTERNET), 1971
Avail: NTIS

Some aspects of integrating existing techniques and computer programs with the human being into existing company or institutional organization structures are examined. Such an effort was undertaken to provide a sound basis for a comprehensive and reliable project management information system. The role of the project controller in these systems is shown, and special problems such as double loyalty, matrix structures, lack in the employment market, lack of appreciation, and cost accounting are discussed. ESRO

N72-17089# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
SYSTEM DESIGN TRADE STUDIES: THE ENGINEERING PROCESS AND USE OF HUMAN RESOURCES DATA Technical Report, 1 Jan. 1970 - 31 May 1971
Larry M. Lintz, William B. Askren (Air Force Human Resources Lab.), and Wayne J. Lott Wright-Patterson AFB, Ohio Air Force Human Resources Lab. Jun. 1971 104 p refs
(Contract F33615-70-C-1564; AF Proj. 1124)
(AD-732201; AFHRL-TR-71-24) Avail: NTIS CSCL 05/9

The engineering trade study process was investigated to determine the feasibility of including human resources data in trade studies. First, sixty one completed trade studies from actual McDonnell Douglas Corporation aeronautical, missile, and command and control systems were analyzed to determine the characteristics of system design trade studies. Four simulated trade studies containing engineering and human resources data and representing flight control and avionics subsystems then were constructed for experimental use. Seventy two experienced design engineers performed the simulated trade studies. It was found that engineers can and do use human resources data in system design trade studies. Personnel costs and quantities are assigned more weighting in the trade studies than skill types, skill levels and availability of personnel. A detailed presentation of human resources data is given more weighting than is a very condensed presentation. Such data should be presented in tabular form, in quantitative fashion and in units familiar to the engineer to be most useful. The four major sources of variability in trade study results were found to be choice of parameters, weighting factors for the parameters, methods of normalizing the parametric data, and methods of combining parametric data and weighting factors. Air Force standardization of trade study methods is recommended to help overcome this variability.
Author (GRA)

N72-17138# Joint Publications Research Service, Washington, D.C.
AUTOMATED CONTROL AND DATA-PROCESSING SYSTEMS IN INDUSTRY AND SCIENTIFIC RESEARCH
27 Jan. 1972 16 p ref Transl. into ENGLISH from Ekon. i Organizatsiya Prom. Proizv. (Novosibirsk, USSR), no. 2, 1971 p 66-73, 84-91
(JPRS-55047) Avail: NTIS

Papers are presented on computerized control systems in Soviet industries and computerized data processing systems for management of Soviet scientific-engineering research institutes.

N72-17140# Joint Publications Research Service, Washington, D.C.
ORGANIZATION OF AUTOMATED DATA PROCESSING SYSTEMS FOR MANAGEMENT OF SCIENTIFIC RESEARCH INSTITUTES AND DESIGN OFFICES
S. T. Mitin *In its* Automated Control and Data-Processing Systems in Ind. and Sci. Res. 27 Jan. 1972 p 9-15

Avail: NTIS

The various steps of using computerized data processing systems in scientific-engineering research institutes are described. All-purpose computers are used for gathering and processing data, and keypunch machines are the primary method of preprocessing the data for computer input. Details are given on the actual gathering and preparation of data, the processing and analysis of data, and the decision making. In the research institutes, the data processing system has two areas: the technical area which provides the solution to problem of simulation and in which experience has been accumulated, and the economic area oriented toward solution of organization or administrative control problems and which is new for the institutes. The individual steps in the processing system are discussed, along with the equipment, programming, and management planning. N.E.N.

N72-17145# Johns Hopkins Univ., Baltimore, Md.
MODELLING GENERALIZED PARALLEL COMPUTER SYSTEMS
R. Regis May 1971 22 p refs
(NYO-4209-14) Avail: NTIS

A class of organizations is considered that are characterized, informally, by independent asynchronously operating units capable of simultaneously processing independent (but related) parts of the same program. In other words, assuming that the problem has been partitioned in a set of tasks which can be performed by the processing units (the notion of task is therefore closely related to the processing units), the communications or interactions between these tasks and their influence on the performance of the system is developed. Author

N72-17312# Mitre Corp., McLean, Va.
A TECHNOLOGY ASSESSMENT METHODOLOGY. VOLUME 1: SOME BASIC PROPOSITIONS Final Report
Martin V. Jones Jun. 1971 307 p refs 7 Vol.
(Contract OST-26)
(PB-202778-1; MTR-6009-1-Vol-1) Avail: NTIS HC $6.00/MF $0.95 CSCL 05A

A standard, structured method for making studies directed toward anticipating and influencing the societal impacts of new technology applications was developed and is described.
Author (GRA)

N72-17317# Mitre Corp., McLean, Va.
A TECHNOLOGY ASSESSMENT METHODOLOGY, PROJECT SUMMARY Final Report
Martin V. Jones Jun. 1971 35 p refs 7 Vol.
(Contract OST-26)
(PB-202778-7; MTR-6009-7-Vol-7) Avail: NTIS CSCL 05A

The findings of the exploratory technology assessment project are summarized. The issues, approach, and conclusions are outlined as well as the individual pilot studies. Author (GRA)

N72-17926# Army Missile Command, Redstone Arsenal, Ala. Cost Analysis Div.
ENGINEERING CHANGE PROPOSALS
James L. Gossett and Riley W. Monroe May 1971 19 p refs
(AD-730758) Avail: NTIS CSCL 16/4

Engineering changes are alterations to the established configuration identification. The number of changes will be dependent upon such factors as readiness of the system for production and technological changes. Definitions for cost areas requiring consideration in determining the total cost of an engineering change proposal have been established.
Author (GRA)

N72-17969*# Auburn Univ., Ala.
STARSITE: SEARCH TO ASSESS RESOURCES, SOCIAL, INSTITUTIONAL, TECHNICAL, AND ENVIRONMENTAL, TOWARD A DECISION-MAKING MECHANISM FOR HOUSING Final Report
Jan. 1972 402 p refs Prepared in cooperation with ASEE
(Grant NGT-01-003-044)
(NASA-CR-61371) Avail: NTIS HC $6.00/MF $0.95 CSCL 05C

The systems approach was used in the seminar on the complex multidisciplinary problem of housing and related environment conditions. The main areas of study are the following: historical overview of housing; diagrammatic presentation of the problem; technological innovations and contributions; management, economic, legal, and political considerations; environment and natural resources; human needs and behavior; model of the housing industry; and potential for implementation. It is felt that a greater attempt should be made to transfer aerospace technology to the housing industry; however, the emphasis of the conference was directed to the modern management techniques developed by NASA. Among the conclusions are the following: The extent and character of the housing problem should be defined. Increased coordination of housing programs within and between Federal agencies is essential. Development of physically sophisticated building systems requires Federal support. New towns of differing life styles need to be created. Physiological and psychological reactions to environmental enclosure need to be defined. N.E.N.

N72-17972# Joint Publications Research Service, Washington, D.C.
COMPUTER USE IN MANAGING USSR INDUSTRY
N. Popov 8 Feb. 1971 11 p Transl. into ENGLISH from Planovoye Khoz. (Moscow), no. 12, Dec. 1971 p 74-79
(JPRS-55133) Avail: NTIS

Mathematical methods and modern computer techniques ensure rational movement of information flows, current processing of diverse information, optimization of controlling actions, a rise in the productivity of managerial labor by means of mechanization and automation of executive functions and technical operations, and also effective functioning of the systems of production control, comprehensively realizing the control of an aggregate of production processes. Author

N72-17974# Oak Ridge National Lab., Tenn.
APPROACH ATTAINING RESPONSIBLE ENGINEERING ACTION
M. Bender 14 Oct. 1971 11 p Presented at the 25th Ann. Quality Control Conf., Hartford, 14 Oct. 1971 Sponsored by AEC
(Conf-711023-1) Avail: NTIS

Engineering considerations wherein the effective end results of the whole effort determines the quality control requirements are presented. The engineering actions are controlled by this end result rather than the arbitrary boundaries of incremental portions of the engineering programs. Author

N72-17982# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN ANALYSIS OF DOD/NASA CONTRACTOR PROFITABILITY IN THE INCENTIVE CONTRACT ENVIRONMENT M.S. Thesis
Jerry Eldon Trimble Oct. 1971 103 p refs
(AD-732909; GSM/SM/71-12) Avail: NTIS CSCL 05/3

This research evaluates the results of the increased use of incentive-type contracts by the Department of Defense and the National Aeronautics and Space Administration. The efficiency and productivity resulting from the use of capital and labor resources by the defense and space firms are compared over a period of time with a group of similar firms having purely commercial business. The comparison is made with the financial indicators of returns on sales, equity capital and total assets, equity capital turnover, total assets turnover, and sales dollars per employee. GRA

N72-18015# Air Canada, Montreal (Quebec).
MAINTENANCE QUALITY AUDIT PROGRAM
R. J. Thatcher 1971 12 p Presented at 7th Ann. FAA Intern. Aviation Maintenance Symp., Oklahoma City, 7-9 Dec. 1971
Avail: NTIS

A quality control program for application to the maintenance of commercial aircraft is presented. The maintenance organization involved in the operation is discussed. The two major areas of concern are: (1) the decisions and programs with respect to what maintenance will be carried out when and (2) the quality and consistency of the actual scheduled and unscheduled work. The application of the system to aircraft operated by Air Canada airlines is emphasized. Author

N72-18019# Douglas Aircraft Co., Inc., Santa Monica, Calif. Structural Mechanics Subdiv.
DEVELOPING THE DC-10 STRUCTURAL INSPECTION PROGRAM
M. E. Stone and H. F. Heap (United Air Lines) 1971 59 p refs Presented at 7th Ann. FAA Intern. Aviation Maintenance Symp., Oklahoma City, 7-9 Dec. 1971
Avail: NTIS

The development of a structural inspection program to extend the service life of DC-10 aircraft is discussed. The three steps required to achieve a safe and economical structure with a service life of twenty years are presented. The factors which affect the variability of service life are described. The basis for the structural inspection program depends upon the effects of fatigue, crack propagation, residual strength, corrosion, and preload. The major differences between the DC-10 inspection program and more conventional programs are identified. Author

N72-18020# General Electric Co., Cincinnati, Ohio. Commercial Engine Div.
CF6-6 ENGINE MAINTENANCE PLANNING AND EXPERIENCE
S. H. Davison 1971 54 p Presented at 7th Ann. Intern. Aviation Maintenance Symp., Oklahoma City, 7-9 Dec. 1971; sponsored by FAA
Avail: NTIS

The proceedings of the International Aviation Maintenance Symposium concerning engine maintenance planning and experience on the CF6-6 jet engine are presented. The important elements used in the development of the maintenance plan are presented. The significance of the relationship of each element to the development of the engine maintenance management program is examined. The process to be followed for correct diagnosis of problem areas and response to the maintenance problem is described. P.N.F.

N72-18021# National Transportation Safety Board, Washington, D.C.
MAINTENANCE, A DIRECT FACTOR IN AVIATION SAFETY
James T. Childs 1971 13 p Presented at 7th Ann. FAA Intern. Aviation Maintenance Symp., Oklahoma City, 7-9 Dec. 1971
Avail: NTIS

The effects of aircraft maintenance practices as an aircraft accident causal factor are discussed. A statistical analysis is presented to show the significance of improper maintenance, servicing, or inspection as an influence on the safe operation of aircraft. It is concluded that a major step toward better aircraft safety can be accomplished with the elimination of maintenance and servicing faults supported by meticulous quality inspection. Author

N72-18022# Federal Aviation Administration, Washington, D.C.
THE FAA'S MAINTENANCE ANALYSIS CENTER
Dec. 1971 6 p
Avail: NTIS

The operation of the Federal Aviation Administration Maintenance Analysis Center is discussed. The objective of the center is to improve aviation safety through service difficulty analysis and the interchange of service difficulty information. The reliability systems, microfilm data bank, technical library and communications procedures are described. The four major computer programs currently in operation by the center are defined. Author

N72-18023# Douglas Aircraft Co., Inc., Santa Monica, Calif. Maintenance Data Analysis.
MAINTAINABILITY AND MAINTENANCE MEASUREMENT
R. V. MacGregor 1971 18 p Presented at the Ann. FAA Intern. Aviation Maintenance Symp., Oklahoma City, 7 Dec. 1971
Avail: NTIS

The concept of quantitatively defining and measuring maintainability loss or achievement in the environment of the designer and manufacturer is considered. A most important difference between maintainability and maintenance measurements is the distinction between cost and value as a characteristics of design. The ability to hypothesize coefficients of lift and drag, and to subsequently measure them in wind tunnel tests, produces relative but measurable values. G.G.

N72-18205# Mechanical Properties Data Center, Traverse City, Mich.
MECHANICAL PROPERTIES DATA CENTER OPERATION AND DEVELOPMENT, 1969 - 1970 Final Report, 1 Nov. 1968 - 31 Oct. 1969
Robert C. Braden Wright-Patterson AFB, Ohio AFML Jul. 1971 33 p refs
(Contract F33615-69-C-1203; AF Proj. 8975)
(AD-733723; AFML-TR-70-86) Avail: NTIS CSCL 05/2

The report reviews and discusses the operation and continuing development of the Mechanical Properties Data Center. Activity and growth of the Center are discussed in terms of the five major work areas: input, file maintenance, output, systems development, and management. Author (GRA)

N72-18478# Central Electricity Generating Board, London (England).
RELIABILITY PROGRAMMING: A SELECTIVE BIBLIOGRAPHY, 1960 OCTOBER 1971
P. G. Williams, comp. Dec. 1971 12 p refs
(CE-Bib-2) Avail: NTIS

A selective bibliography on reliability programming is presented. The collection contains 47 references and covers various aspects of reliability management systems. G.G.

N72-18981*# TRW Systems, Houston, Tex.
ANALYSIS OF THE APOLLO SPACECRAFT OPERATIONAL

DATA MANAGEMENT SYSTEM. EXECUTIVE SUMMARY
Dec. 1971 27 p
(Contract NAS9-12330)
(NASA-CR-115422; TRW-20029-H006-R0-00) Avail: NTIS CSCL 05C

A study was made of Apollo, Skylab, and several other data management systems to determine those techniques which could be applied to the management of operational data for future manned spacecraft programs. The results of the study are presented and include: (1) an analysis of present data management systems, (2) a list of requirements for future operational data management systems, (3) an evaluation of automated data management techniques, and (4) a plan for data management applicable to future space programs. D.L.G.

N72-18982*# Computer Sciences Corp., Huntsville, Ala.
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MANNED SPACECRAFT CENTER DATA BASED REQUIREMENTS STUDY Executive Summary
30 Jul. 1971 27 p
(Contract NAS9-10995)
(NASA-CR-115379) Avail: NTIS CSCL 05B

The results are summarized of a study to determine the requirements of a data management system to meet the needs of MSC in mission planning and program and resource management during the 1975 time frame. The study addresses overall system requirements, implementation considerations, and cost/benefit comparisions. Author

N72-18983*# Computer Sciences Corp., Huntsville, Ala.
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MANNED SPACECRAFT CENTER DATA BASE REQUIREMENTS STUDY Final Report
30 Jul. 1971 101 p refs
(Contract NAS9-10995)
(NASA-CR-115380) Avail: NTIS CSCL 05B

A study was conducted to evaluate the types of data that the Manned Spacecraft Center (MSC) should automate in order to make available essential management and technical information to support MSC's various functions and missions. In addition, the software and hardware capabilities to best handle the storage and retrieval of this data were analyzed. Based on the results of this study, recommendations are presented for a unified data base that provides a cost effective solution to MSC's data automation requirements. The recommendations are projected through a time frame that includes the earth orbit space station. D.L.G.

N72-18984*# Northwestern Univ., Evanston, Ill. Dept. of Industrial Engineering and Management Sciences.
THE EFFECTS OF WORK-RELATED VALUES ON COMMUNICATION BETWEEN R AND D GROUPS, PART 1 Ph.D. Thesis
Charles Fowler Douds Aug. 1970 166 p refs Supported in part by Army, NASA, ESSA, and NSF
(NASA-CR-125380; Rept-70/32-Pt-1) Avail: NTIS CSCL 05A

The research concerned with the liaison, interface, coupling, and technology transfer processes that occur in research and development is reported. Overviews of the functions of communication and coupling in the R and D processes, and the theoretical considerations of coupling, communication, and values are presented along with descriptions of the field research program and the instrumentation. F.O.S.

N72-18985*# Northwestern Univ., Evanston, Ill. Dept. of Industrial Engineering and Management Sciences.
THE EFFECTS OF WORK-RELATED VALUES ON COMMUNICATION BETWEEN R AND D GROUPS, PART 2 Ph.D. Thesis
Charles Fowler Douds Aug. 1970 259 p refs Supported in part by Army, NASA, ESSA, and NSF
(NASA-CR-125381; Rept-70/32-Pt-2) Avail: NTIS CSCL 05A

The methods are presented by which the scales and indicators are combined to provide measures of the variables used in the similarity propositions. These variables are constructs employed to describe the relationships among various phenomena occurring in R and D organizations. The character of these constructs as revealed by the characteristics of the measures derived from response patterns is presented. The reliability and validity of the measures are considered, and test procedures are discussed. Author

N72-19164# Joint Publications Research Service, Arlington, Va.
STUDIES OF MAN-MACHINE RELATIONSHIPS
17 Feb. 1972 21 p refs Transl. into ENGLISH from Prib. Sist. Upr. (Moscow), no. 7, 1971 p 6-12
(JPRS-55216) Avail: NTIS

Man machine interactions and their optimizations are considered for operators working at keyboard devices of data collecting systems, monitors of industrial processes, and managerial personnel of information displays.

N72-19166# Joint Publications Research Service, Arlington, Va.
SELECTION OF OPERATIONAL CHECK POINTS
I. M. Panasenko *In its* Studies on Man-Machine Relationships 17 Feb. 1972 p 7-14 refs
Avail: NTIS

A working model is formulated for determining the minimum number of check points required for the human operator for operational monitoring of an industrial process where the monitored parameters which characterize events that require intervention are regarded as operational check points. Graphs of the most indicative parameters interconnections which affect external influences are developed whose vertices are the working parameters of the installation, and whose arcs are the gain factors characterizing the variation of each successive parameters as a function of the preceding one. Knowing the gain factors of each influence on each parameter and by imposing external constraints that are associated with the correct installation operation, the single parameters necessary for operational monitoring are obtained. G.G.

N72-19167# Joint Publications Research Service, Arlington, Va.
INFORMATION DISPLAY METHOD IN DISCRETE-PRODUCTION AUTOMATIC CONTROL SYSTEMS
M. I. Abezgauz, Yu. A. Golant, Ye. P. Tereshko, and A. S. Grinberg *In its* Studies on Man-Machine Relationships 17 Feb. 1972 p 15-20
Avail: NTIS

The organizational structure of a complex of documents that enables dispatcher personnel to conveniently use the documentation is considered. Codograms for an information resources scheme and the structure of documents for display are developed from interconnected events within the limits of competence for a given managerial worker, and also by the number of controlled events reflected by the given complex of documents. The final form-regulation report determines the makeup of the codograms which reflect the activities of other workers included in the group. G.G.

N72-19236# Technische Hochschule Munchen (West Germany). Fakultaet fuer Allgemeine Wissenschaften.
DECISION MODELS FOR THE SELECTION OF COMPUTER SYSTEMS Ph.D. Thesis [ENTSCHEIDUNGSMODELLE FUER DIE AUSWAHL VON COMPUTERSYSTEMEN]
Gunther Diruf 19 Jul. 1971 234 p refs In GERMAN
Avail: NTIS

Rational selection of an industrial computer system is considered by evaluating its internal structure and orientation towards management goals with the help of decision and systems models. Generalized OR models are used to develop a two-step stochastic, analytical macro-model for the multiprogramming and multiprocessing operations, that requires relative minimal and easily extracted data. Data sources and receivers are humans or machines outside of the computer system. A suitable quantitative description of the work load and the functional connections between alternate configurations and overall load are obtained by using a sequential model for waiting lines. Transl. by G.G.

N72-19307# Air Force Systems Command, Washington, D.C.
THE TEST FACILITY'S ROLE IN THE EFFECTIVE DEVELOPMENT OF AEROSPACE SYSTEMS Final Report, 1 Sep. 1970 - Jul. 1971
James G. Mitchell Sep. 1971 199 p refs
(AD-731548; AFSC-TR-71-01) Avail: NTIS CSCL 14/2

Some of the major problems associated with the use and usefulness of aeronautical test facilities (wind tunnels, etc.) in the development of aerospace systems are defined and analyzed. Contributions to the study have come from 117 of this country's more experienced and prominent aerospace experts from government and industry. The origin of the facility test plan and the use of the test facility to support DOD system's development philosophy are explored and suggestions are made to: reduce conflicting incentives and permit an expanded role for the test facility. The deficiencies in test facilities are shown to produce consequences which are resulting in higher system cost and less system performance. The major facility inadequacies are enumerated and specific examples are noted wherein lack of test capability has had detrimental effects on system performance. Thirty-five of the recent aircraft development programs are studied and evaluated to determine a procedure whereby the use of the test facility can be optimized. A multiple regression analysis is used to develop a procedure for defining an optimal facility test program. Author (GRA)

N72-19430*# Research Analysis Corp., McLean, Va. Science and Technology Dept.
PROGRAM MANAGEMENT MODEL STUDY
J. J. Connelly, J. E. Russell, J. R. Seline, and N. R. Sumner Feb. 1972 183 p refs
(Contract NAS5-11398)
(NASA-CR-122363; RAC-CR-50) Avail: NTIS CSCL 08G

Two models, a system performance model and a program assessment model, have been developed to assist NASA management in the evaluation of development alternatives for the Earth Observations Program. Two computer models were developed and demonstrated on the Goddard Space Flight Center Computer Facility. Procedures have been outlined to guide the user of the models through specific evaluation processes, and the preparation of inputs describing earth observation needs and earth observation technology. These models are intended to assist NASA in increasing the effectiveness of the overall Earth Observation Program by providing a broader view of system and program development alternatives. Author

N72-19455# Engineer Agency for Resources Inventories, Washington, D.C.
NATIONAL RESOURCES SURVEY GUIDANCE MANUAL. RESOURCES ATLAS PROJECT: THAILAND
Ernest Jackman Nov. 1971 242 p refs
(DACA71-69-C-0014; ARPA Order 1035)
(AD-734007) Avail: NTIS CSCL 08/6

The basic purpose of this guidance manual is to make available the practical and technical experience accumulated during many years of work in the preparation of resources inventory studies. Included in this manual are an introductory chapter; a chapter on planning of resources inventory studies; a chapter on maps, aerial photography and cartographic techniques; a chapter on text preparation; and a chapter on data storage and retrieval. Appendixes include organizational charts of the Applied Scientific Research Corporation of Thailand and Resources Inventory Group, job descriptions for RIG, descriptions and details for 32 inventory topics, map coverage indexes for Thailand, and an example of a flow chart. Author (GRA)

N72-19728# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ALGORITHM AND GENERAL PRINCIPLES OF INFORMATION PROCESSING IN A CIVIL AVIATION TRAFFIC SYSTEM
M. Libura and S. Walukiewicz 18 Oct. 1971 25 p refs Transl. into ENGLISH from Polska Akad. Nauk, Inst. Automatyki, Prace (Poland), no. 83, 1969 p 1-25
(AD-734881; FTD-HC-23-953-71) Avail: NTIS CSCL 17/7

A description is given of steps involved in flight planning and control of flight plan completion required for a complete air traffic control system at airports. The proposed concept of flight control automation is characterized by the use of a closed Air Traffic ATC System, where ATC has feedback on control quality which allows the introduction of changes required with time. The study features mathematical descriptions which can serve as a basis for detailed theoretical and practical investigations. Author (GRA)

N72-19972*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
INFORMATION MANAGEMENT SYSTEM STUDY RESULTS. VOLUME 1: IMS STUDY RESULTS
Nov. 1971 515 p
(Contract NAS8-25140)
(NASA-CR-123547; MDC-G2584-Vol-1) Avail: NTIS HC $6.00/MF $0.95 CSCL 05B

The information management system (IMS) special emphasis task was performed as an adjunct to the modular space station study, with the objective of providing extended depth of analysis and design in selected key areas of the information management system. Specific objectives included: (1) in-depth studies of IMS requirements and design approaches; (2) design and fabricate breadboard hardware for demonstration and verification of design concepts; (3) provide a technological base to identify potential design problems and influence long range planning (4) develop hardware and techniques to permit long duration, low cost, manned space operations; (5) support SR&T areas where techniques or equipment are considered inadequate; and (6) permit an overall understanding of the IMS as an integrated component of the space station. Author

N72-19974*# Clingman (W. H.) and Co., Dallas, Tex.
A CONTINUING PROGRAM FOR TECHNOLOGY TRANSFER TO THE APPAREL INDUSTRY Final Report, 1 Feb. - 31 Jul. 1971
William H. Clingman 31 Aug. 1971 81 p refs Prepared for Informatics-TISCO, Inc., Coll. Park, Md.
(Contract NASw-1812)
(NASA-CR-125681) Avail: NTIS

A six month program has been carried out to investigate various mechanisms for transferring technology to industry. This program has focused on transfer to the apparel industry through the Apparel Research Foundation. The procedure was to analyze the problem, obtain potentially relevant aerospace technology, and then transfer this technology to the industry organization. This was done in a specific case. Technology was identified relevant to stitchless joining, and this technology was transferred to the Apparel Research Foundation. The feasibility and ground rules for carrying out such activities on a broader scale were established. A specific objective was to transfer new technology from the industry organization to the industry itself. This required

the establishment of an application engineering program. Another transfer mechanism tested was publication of solutions to industry problems in a format familiar to the industry. This is to be distinguished from circulating descriptions of new technology. Focus is on the industry problem and the manager is given a formula for solving it that he can follow. It was concluded that this mechanism can complement the problem statement approach to technology transfer. It is useful in achieving transfer when a large amount of application engineering is not necessary. A wide audience is immediately exposed to the technology. On the other hand, the major manufacturing problems which require a sophisticated technical solution integrating many innovations are less likely to be helped. Author

N72-19979*# Neoterics, Inc., Cleveland, Ohio.
A SYSTEM OVERVIEW OF THE AEROSPACE SAFETY RESEARCH AND DATA INSTITUTE DATA MANAGEMENT PROGRAMS
Washington NASA Mar. 1972 63 p
(Contracts NAS3-13341; NAS3-14979)
(NASA-CR-1976; NEO-2040-711) Avail: NTIS CSCL 05B

The NASA Aerospace Safety Information System, is an interactive, generalized data base management system. The on-line retrieval aspects provide for operating from a variety of terminals (or in batch mode). NASIS retrieval enables the user to expand and display (review) the terms of index (cross reference) files, select desired index terms, combine sets of documents corresponding to selected terms and display the resulting records. It also allows the user to print (record) this information on a high speed printer if desired. NASIS also provides the ability to store the strategy of any given session the user has executed. It has a searching and publication ability through generalized linear search and report generating modules which may be performed interactively or in a batch mode. The user may specify formats for the terminal from which he is operating. The system features an interactive user's guide which expains the various commands available and how to use them as well as explanations for all system messages. This explain capability may be extended, without program changes, to include descriptions of the various files in use. Coupled with the ability of NASIS to run in an MTT (multi-terminal task) mode is its automatic accumulation of statistics on each user of the system as well as each file. Author

N72-19982# Atomic Energy Commission, Washington, D.C.
RESEARCH CONTRACTS IN THE PHYSICAL SCIENCES
1 Jul. 1971 37 p refs
(WASH-1188) Avail: NTIS

The operations of the Physical Research Program are described, and a listing of Federally funded research and development centers is given. Individual summaries are presented of contracts by state, off-site contracts, and new proposals received and actions taken. In addition, separate listings of contracts are given, arranged according to the various fields of research. These fields include: high, medium, and low energy physics; mathematics and computers; chemistry; metallurgy and materials; and controlled thermonuclear research. D.L.G.

N72-19990# Purdue Univ., Lafayette, Ind.
THE PROCUREMENT PROCESS AND PROGRAM COST OUTCOMES: A SYSTEMS APPROACH Ph.D. Thesis. Final Report
Richard Stephen Sapp Jun. 1971 252 p refs Sponsored by Air Force
(AD-734440) Avail: NTIS CSCL 15/5

A systems approach is used to view the process by which the Department of Defense acquires and modifies its major weapon systems. Attention is focused on the program cost outcomes of this procurement process. The research seeks out the causes of why the final cost of a defense program or contract differs from earlier estimates. The evolution of the term cost overrun into cost growth is traced. Systems diagramming is used to develop a model of the procurement process. The model demonstrates the multiplicity of relationships affecting defense programs. Author (GRA)

N72-20003# Seagram (Joseph E.) and Sons, Inc., New York.
THE MAINTENANCE DEPARTMENT INSPECTION PROGRAM
Jon M. Rives [1971] 6 p Presented at the 7th Ann. FAA Intern. Aviation Maintenance Symp.
Avail: NTIS

The establishment of a continuous inspection and maintenance schedule for determining the airworthiness of aircraft is discussed in terms of changes to current FAR that direct the operators to follow the manufacturer's recommended procedures. It is concluded that the proposed FAR change allows maintenance managers to actually manage the maintenance to suit their requirements and still have an airworthy aircraft. F.O.S.

N72-20004# Eastern Air Lines, Inc., Miami, Fla.
B747 PERSONALIZED MAINTENANCE APPROACH
Frederick J. Lind 7 Dec. 1971 8 p
Avail: NTIS

The Eastern Airlines maintenance program for the Boeing 747 aircraft is described along with personnel training. The personalized approach is illustrated by showing the activities of maintenance personnel on the JFK-SJU turn around flight. F.O.S.

N72-20175 National Lending Library for Science and Technology, Boston Spa (England).
GENERAL DESCRIPTION OF THE COMPUTER PROGRAMS USED BY THE EdF NATIONAL CONTROL CENTER
D. Boulle and M. Vincent [1971] 24 p ref Transl. into ENGLISH from Rev. Gen. Elec. (France), v. 80, no. 5, May 1971 p 383-392
(NLL-CE-Trans-5808-(9022.09)) Avail: Natl. Lending Library, Boston Spa, Engl.: 2 NLL photocopy coupons

Computer programs designed to help forecast reliability of supply, quality of service, and economy of operation for hydroelectric power plants, are described. Descriptions of computation methods at various forecasting stages-long term control, weekly forecasting, and daily forecasting are given. Author

N72-20595# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Systemanalysen.
AIR TRAFFIC PLANNING WITH METHODS OF LINEAR PROGRAMMING
Otto W. Pfeifer and Hartmut Wolff 1971 72 p refs In GERMAN; ENGLISH summary
(DLR-FB-71-60) Avail: NTIS; DFVLR Porz: 16,50 DM

To give survey on various mathematical models for air traffic planning, those tasks were chosen and analyzed which yield linear set-ups. It was found that many of the air transportation problems may be represented as linear models, whereas comprehensive tasks such as the establishing of a real, optimum flight scheme cannot be treated purely linearly. In case of real problems, difficulties often occur with the numerical evaluation of the mathematical set-up to be optimized. Author

N72-20935*# Indiana Univ. Foundation, Bloomington.
STATISTICAL AND OPERATIONAL SUMMARIES Final Annual Report
Joseph DiSalvo 15 Jan. 1972 27 p
(Contract NASW-2171)
(NASA-CR-125888; AR-1) Avail: NTIS CSCL 05A

Statistical progress indicator forms are presented on the financial management of the research allocations. Promotional activities, conference participants, and services are tabulated. The staffing and activity levels are also discussed, as well as the fee schedule revision and the standard interest profile offerings.
J.A.M.

N72-20936# Committee on Science and Astronautics (U. S. House).
ACQUISITION OF CAPITAL PLANT - NASA
Washington GPO Feb. 1972 57 p refs Presented to the Comm. on Sci. and Astronaut., 92d Congr., 2d Sess., 28 Feb. 1972
Avail: Subcomm. on NASA Oversight

A report compiled from testimony concerning the inquiry into NASA's policies and procedures regarding the acquisition of capital plant is presented. Field level staff reviews revealed that much of the capital plant expansion was derived from funds for programs which did not reflect specific plant acquisition items. Irregularities at the Marshall Space Flight Center reported by the General Accounting Office are included. Some of the conclusions reached are: (1) NASA has not kept the committee fully and currently informed with regard to the acquisition of major facilities and equipment. (2) The annual authorization requests do not adequately identify and define the extent to which authorized funds will be used to acquire major items of a capital plant nature. (3) The use of research and development funds for new construction and rehabilitation and modifications at NASA field centers has been widespread. Recommendations for clarifying congressional intent with regard to the acquisition of the facilities and equipment are included. F.O.S.

N72-20944*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
PROPRIETARY SOFTWARE
Marvin J. Marnock Oct. 1971 16 p
(NASA-TM-X-67660) Avail: NTIS CSCL 05A

The protection of intellectual property by a patent, a copyright, or trade secrets is reviewed. The present and future use of computers and software are discussed, along with the governmental uses of software. The popularity of contractual agreements for sale or lease of computer programs and software services is also summarized. J.A.M.

N72-20945# RAND Corp., Santa Monica, Calif.
BUDGETS IN A DECENTRALIZED ORGANIZATION WITH INCOMPLETE INFORMATION
Martin Shubik Dec. 1970 25 p refs
(P-4514) Avail: NTIS

The problem of incentives in a decentralized organization where there is lack of information is discussed. It stresses the difficulty of designing incentive systems and provides a simple example to illustrate some of the problems. The treatment of the central agency and the decentralized departments is an n-person game. Author

N72-20946# RAND Corp., Santa Monica, Calif.
MAKING EVALUATION EFFECTIVE: A GUIDE
R. A. Levine and A. P. Williams, Jr. May 1971 47 p
(Contract C-MU-HEW5-70-155)
(R-788-HEW/CMU) Avail: NTIS

This is a guide to assist evaluators in the development of a strategy in determining: when to evaluate, who should evaluate and supervise the evaluation, how to allocate efforts among different types of evaluation, and assessing evaluation. The four objectives of the guide are to aid in: (1) the planning of evalution and related activities so limited resources are put where most needed; (2) carrying out evaluations in ways that are most likely to help in the making of decisions; (3) assessing and improving the total evaluation effort; and (4) using evaluation as a part of the policy making process. Author

N72-20949# RAND Corp., Santa Monica, Calif.
CHANGE AND THE MANAGEMENT OF CHANGE
E. P. Durbin May 1971 11 p refs Presented at Human Resource Allocation Symp., Los Angeles, 15 Apr. 1971
(P-4652) Avail: NTIS

The failure of industries and government to account for institutional characteristics and their effect on policy process, policy initiation, choices between policies, and implementation of policy is examined. It is stated that planners and managers do not account adequately for organizational characteristics, they resist change, they do not learn, and they adapt very slowly. In the 70's the accelerating change from technology towards humanism will cause problems with increased government involvement and demands on the private sector. Management systems will have to deal with complex and unmeasurable social values and issues. J.A.M.

N72-20954# RAND Corp., Santa Monica, Calif.
AN AGENDA FOR MANAGEMENT ANALYSIS
D. J. Alesch Sep. 1971 6 p refs Presented at 7th Management Analysis Conf., Hershey, Pa., 5 Nov. 1970
(P-4706) Avail: NTIS

Management analysis for governmental agencies is discussed. A four point agenda for management analysts is proposed which includes: (1) Analysts must reexamine organizational behavior, organizational change, and socio-technical systems in the light of new developments. (2) Analysts must view government as a complex set of systems steering an even more complex set of systems. (3) Analysts must focus on quantity and quality of the output of an agency as it relates to community problems. (4) Analysts must develop an expanded repertoire of analytical techniques. F.O.S.

N72-21029# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A COST/DECISION MODEL FOR THE DEFERRED PROCUREMENT OF AN AIR FORCE DEPOT MAINTENANCE CAPABILITY WITH A COMPUTERIZED APPLICATION TO THE F-15 INS M.S. Thesis
Michael S. Clark and Robert E. Johnson Nov. 1971 230 p refs
(AD-735351; GSM/SM/71-2) Avail: NTIS CSCL 01/3

The report presents a decision model to aid decision-makers in evaluating the costs of establishing an Air Force depot maintenance capability at different points in time. The cost elements of depot maintenance are identified and defined in denotative terms. The model incorporates techniques for the explicit treatment of uncertainty, converting dollar requirements into expenditures, and the considerations of inflation and discounting (present value). Author (GRA)

N72-21080# Human Resources Research Organization, Alexandria, Va.
SYSTEMS ENGINEERING OF COAST GUARD AVIATOR TRAINING
Eugene R. Hall and Paul W. Caro Aug. 1971 10 p refs Presented at the Psychology in the Air Force Symp., Colo. Springs, Colo., Apr. 1971
(Contract DOT-CG-2310-A)
(AD-735051; HumRRO-PP-17-71) Avail: NTIS CSCL 05/9

The paper describes a total-program application of the systems engineering concept to the U.S. Coast Guard aviation training programs. The systems approach used treats all aspects of the training to produce the most cost-effective integration of academic, synthetic, and flight training for the production of

graduate Coast Guard aviators. The paper describes the techniques used to develop job-relevant terminal behavioral objectives (the Coast Guard search and rescue flight mission provides the operational context); the assignment of objectives to academic, synthetic, and flight training; the integration of these components into a systems-engineered training program; the development of relatively objective proficiency assessment techniques; and the development of a flying training quality control system for maintaining and enhancing instructional efficiency and for management of the training system. Author (GRA)

N72-21205*# Intermetrics, Inc., Cambridge, Mass.
ADVANCED SOFTWARE TECHNIQUES FOR DATA MANAGEMENT SYSTEMS. VOLUME 2: SPACE SHUTTLE FLIGHT EXECUTIVE SYSTEM: FUNCTIONAL DESIGN
Final Report, 16 Jun. 1971 - 16 Feb. 1972
James T. Pepe Feb. 1972 187 p refs
(Contract NAS9-11778)
(NASA-CR-115514; TR-12-72-Vol-2) Avail: NTIS CSCL 09B

A functional design of software executive system for the space shuttle avionics computer is presented. Three primary functions of the executive are emphasized in the design: task management, I/O management, and configuration management. The executive system organization is based on the applications software and configuration requirements established during the Phase B definition of the Space Shuttle program. Although the primary features of the executive system architecture were derived from Phase B requirements, it was specified for implementation with the IBM 4 Pi EP aerospace computer and is expected to be incorporated into a breadboard data management computer system at NASA Manned Spacecraft Center's Information system division. The executive system was structured for internal operation on the IBM 4 Pi EP system with its external configuration and applications software assumed to the characteristic of the centralized quad-redundant avionics systems defined in Phase B. Author

N72-21293# European Space Operations Center, Darmstadt (West Germany).
PROJECT COORDINATION AND MISSION SUPPORT IN ESOC
G. Dondi *In* ESRO Spacecraft Operations, vol. 1 Apr. 1971 p 13-36
Avail: NTIS

The activities of EROC are broadly introduced against the background of the European space programs, and the need for for coorination between an establishment organized by functions and space activities is discussed. The various aspects of mission support preceding launch of a spacecraft are emphasized, the concept of mission requirements and ESOC commitments are explained, and the interactive character of this support function is shown. The problems of mission support after launch of a spacecraft are analyzed, together with the changing roles of the project team and scientists. Mission support during the lifetime of a single project, and coordination and support for several concurrent projects are examined. Typical case studies are introduced to show the practical impact of providing mission support in an environment having the usual budget, manpower, and structural limitations of an organization. Author (ESRO)

N72-21572# Carnegie-Mellon Univ., Pittsburgh, Pa. Management Sciences Research Group.
ON THE MAXIMUM PRINCIPLE FOR DISCRETE DYNAMICAL SYSTEMS WITH LAGS
Claude-Alain Burdet and Suresh P. Sethi Nov. 1971 19 p refs
(Contract N00014-67-A-0314-0007; NR Proj. 047-048)
(AD-735475; RR-262) Avail: NTIS CSCL 12/1

The paper presents a discrete formulation of optimal control problems with lags. A maximum principle for such systems is established constructively within the framework of the discrete optimal control theory. The questions of sufficiency and existence are also studied. Author (GRA)

N72-21648# Oak Ridge National Lab., Tenn.
MODEL FOR THE ECONOMIC ANALYSIS OF HIGH LEVEL RADIOACTIVE WASTE MANAGEMENT
R. S. Dillon, J. J. Perona, and J. O. Blomeke Nov. 1971 79 p refs
(Contract W-7405-eng-26)
(ORNL-4633) Avail: NTIS

The economic analysis encompasses interim liquid storage of the high-level fission product wastes, solidification, interim solid storage, shipment, and final storage in salt mines. Economic data obtained from each of the five waste management steps are subjected to a discounted cash-flow calculation using a specified rate of return to arrive at a levelized incremental power cost necessary to recover all waste management costs. The economic model is structured to perform either a government financing calculation or a calculation indicative of private financing. The program provides detailed cost summaries of the capital and operating expenses for each of the management steps, including the incremental power cost for each step. The total levelized cash flow required for the operation and the maximum unrecovered capital are also generated. Minimum total costs for five different schedules of waste management operations were calculated for a nominal 20,000-MW(e) nuclear economy of typical light water reactors. Author (NSA)

N72-21884*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SUPPORTING RESEARCH AND TECHNOLOGY
Nov. 1971 182 p ref
(Contract NAS8-25140)
(NASA-CR-123541; MDC-G2596; MSFC-DPD-235/DR-SE-10)
Avail: NTIS CSCL 22B

The development of definition of the modular space station is discussed. The modular approach was evaluated, the requirements were defined, and program definition and design were accomplished. The features of the program which significantly affect the initial development and early operating costs were identified and their impacts on the program were assessed. Specifications of various systems and components are included. Author

N72-21894*# National Aeronautics and Space Administration, Washington, D.C.
SPACECRAFT PLATFORM COST ESTIMATING RELATIONSHIPS
Werner M. Gruhl Mar. 1972 36 p
(NASA-TM-X-68851) Avail: NTIS CSCL 22B

The three main cost areas of unmanned satellite development are discussed. The areas are identified as: (1) the spacecraft platform (SCP), (2) the payload or experiments, and (3) the postlaunch ground equipment and operations. The SCP normally accounts for over half of the total project cost and accurate estimates of SCP costs are required early in project planning as a basis for determining total project budget requirements. The development of single formula SCP cost estimating relationships (CER) from readily available data by statistical linear regression analysis is described. The advantages of single formula CER are presented. Author

N72-21967*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
INFORMATION MANAGEMENT SYSTEM STUDY RESULTS. VOLUME 2: IMS STUDY RESULTS APPENDIXES
Nov. 1971 171 p refs
(Contract NAS8-25140)
(NASA-CR-121088; MDC-G2584-Vol-2-App) Avail: NTIS CSCL 05B

Computer systems program specifications are presented for the modular space station information management system. These are the computer program contract end item, data bus system, data bus breadboard, and display interface adapter specifications. The performance, design, tests, and qualification requirements are established for the implementation of the information management system. For Vol. 1, see N72-19972.
N.E.N.

N72-21970# Waterloo Univ. (Ontario). Transport Group.
SIMULATING THE TURNAROUND OPERATION OF PASSENGER AIRCRAFT USING THE CRITICAL PATH METHOD
John P. Braaksma May 1971 175 p refs Sponsored in part by NRC of Can. and the Transport Dept., Ottawa
Avail: NTIS; Issuing Activity: $2.50

Ways to improve gate utilization at existing airports are studied by developing a simulation model of the turnaround operation. The model is based on the critical path method and consists of two components. The first is a network which represents the sequence and interrelationships of the turnaround activities. The second component is a set of parameters which transforms input data of a particular flight into activity durations. Numerical values for the parameters were obtained from an apron time survey conducted at Toronto International Airport. The aircraft types surveyed were DC 8L, DC 8, 707, 727L, 727, DC 9, and 737. Similarly the logic of the network was derived from observations on these aircraft made at the same airport. The output of the model predicts the turnaround time of a particular flight, identifies the critical path, and gives the spare time or float associated with the noncritical activities. The model was tested using two separate sets of data obtained from Toronto and it was demonstrated that it adequately represented the turnaround operations. Author

N72-21971# Waterloo Univ. (Ontario). Transport Group.
NOTES FOR A SHORT COURSE ON PRACTICAL APPLICATIONS OF REGIONAL DEVELOPMENT MODELS
O. Stradal (Swiss Federal Inst. of Tech., Zurich. Inst. for Natl., Regional and Local Planning) and B. G. Hutchinson Nov. 1971 147 p refs Sponsored in part by Can. Transport Comm.
Avail: NTIS; Issuing Activity: $3.00

A review of land use models for development of cities and regions is presented. Three levels of models are identified which are relevant to regional development planning, as follows: (1) macro models of regional development where the whole region is considered as a unit, (2) models of the allocation activities within a region where the development is observed relative to a set of individual zones, and (3) sector models, or one purpose models, such as transport and retail trade allocation models. Practical applications of equilibrium type models and selection of the best from a set of alternatives are discussed. Author

N72-21972# Waterloo Univ. (Ontario). Transport Group.
A DESIGN METHOD FOR THE PREPARATION OF A PRELIMINARY URBAN LAND USE/TRANSPORT PLAN
Richard W. Cockfield May 1970 196 p ref Sponsored in part by Central Mortgage and Housing Corp. of Ottawa, NRC of Can., Ind. Acceptance Corp. of Montreal
Avail: NTIS; Issuing Activity: $2.50

An original concept is developed from fundamentals and translated into a formulation for the purpose of deterministically synthesizing preliminary urban land use/transport plans. The urban entity is conceptualized as a system of human activities. Each activity requires a certain known amount of space and time in order to be undertaken by an individual. The urban population supplies a known amount of structural space for the period of time that the activities are undertaken. The degree to which the structural space is utilized is the total sum of the difference between the product of the amount of structural space supplied and the amount of time it is supplied for an activity and the product of the amount of space required and the amount of time it is required. The objective is to maximize the utilization of the structural space by minimizing the number of structural spaces which must be supplied. This is achieved by forming the activities and their associated products of space and time required into the minimum number of subsets. When attempts are made to minimize the number of subjects in accordance with certain constraints of land use and transport a plan is produced.
Author

N72-21985# RAND Corp., Santa Monica, Calif.
UNIFORMITY THEOREMS IN MISSILE DUELS
Joel Spencer Sep. 1971 29 p ref
(Contract F44620-67-C-0045)
(AD-735260; R-844-PR) Avail: NTIS CSCL 15/3

A theorem dealing with the purchase of defensive weapon systems is proven. The purchaser's objective is assumed to be the achievement of an assumed destruction criterion at minimal cost. It is shown that under certain circumstances it is optimal to purchase a uniform defensive system. The applicability of the mathematical theorem to the real world is then studied. A second theorem gives a simple procedure for finding an attacker's optimal firing rule under very general circumstances. An example illustrates the problems in choosing a defensive weapon system. Author (GRA)

N72-21988# Army Weapons Command, Rock Island, Ill. Cost Analysis Office.
COST ESTIMATING RELATIONSHIPS FOR AIRCRAFT ARMAMENT SUBSYSTEM MANUFACTURING LABOR COST
Patrick J. Gannon Sep. 1971 38 p refs
(AD-735495; AMSWE-CPE-71-11) Avail: NTIS CSCL 19/6

Cost estimating relationships for pintle, side mounted and turret aircraft armament subsystems are described in sufficient detail to allow someone to estimate direct labor plus quality control labor costs given subsystem weight and quantity to be procurred. Author (GRA)

N72-22039# RAND Corp., Santa Monica, Calif.
A STUDY OF IRAN EFFECTIVENESS FOR THE F-106
Theodore S. Donaldson Oct. 1971 34 p refs
(Contract F44620-67-C-0045)
(AD-736410; R-755-PR) Avail: NTIS CSCL 01/3

The report describes an investigation of the effect of IRAN (inspect and repair as necessary) depot maintenance on the F-106 aircraft. This effect is measured in terms of aircraft performance (using ADCM 66-28 data) before and after IRAN, and in terms of interval length between successive IRANs. Results indicate that aircraft are not in a degraded condition prior to IRAN, and are not improved by IRAN. Further, aircraft with long intervals (calendar time or flying hours) between successive IRANs are not in worse condition than those with short intervals. Author (GRA)

N72-22076*# Exotech, Inc., Washington, D.C.
QUARANTINE DOCUMENT SYSTEM INDEXING PROCEDURE Interim Report
Mar. 1972 180 p refs
(Contract NASw-2062)
(NASA-CR-126215; TR72-09) Avail: NTIS CSCL 06M

The Quarantine Document System (QDS) is described including the indexing procedures and thesaurus of indexing terms. The QDS consists of these functional elements: acquisition, cataloging, indexing, storage, and retrieval. A complete listing of the collection, and the thesaurus are included. F.O.S.

N72-22173# British Overseas Airways Corp., London (England).
PLANNING AND DEVELOPMENT OF COMPUTER OUTPUT ON MICROFILM FOR A COMMERCIAL APPLICATION
B. S. Harris *In* AGARD Image Storage and Transmission Systems for the Dissemination of Inform. Feb. 1972 8 p

Avail: NTIS

The computer/communications structure in a well-dispersed international organization are outlined, and a specific examination is made of the computer output to microfilm technique. The equipment used is described, principles of operation examined, and current and future applications discussed. Author

N72-22194# Mitre Corp., Bedford, Mass.
AIDS USERS' MANUAL
C. A. Marcus Aug. 1971 92 p refs
(Contract F19628-71-C-0002; AF Proj. 4060)
(AD-736415; MTR-2203; ESD-TR-71-383) Avail: NTIS CSCL 09/2

AIDS is a computer software package designed to provide data management capabilities to a wide variety of users. It is written primarily in COBOL and is designed and implemented on the Honeywell G-635. This system, originally developed for NASA by General Electric Co., Apollo Systems Division, was named Manned Space Flight-Data Processing System (MSF-DPS). Modifications were made to improve the capabilities of MSF-DPS. These modifications, designed to meet interim requirements of the Air Force Data Services Center (AF/ACS), provide a responsive, versatile data management system for users of Honeywell (GE) 600 series computers. This technical report, designed for users of AIDS, details the features of this system and provides examples of its use. Detailed system description (installation, maintenance, internal linkages, etc.) are *not contained in this report.* *Author (GRA)*

N72-22959* George Washington Univ., Washington, D.C.
THE MANAGEMENT OF TECHNOLOGY ASSESSMENT
Louis H. Mayo *In its* Technol. Assessment: Understanding the Social Consequences of Technol. Appl. 1972 p 71-122 refs

Avail: Praeger Publishers, 111 4th Ave., New York, N. Y. 10003 CSCL 05B

The total problem concept of technology assessment, involving a comprehensive information management activity with an objective orientation to the assessment function is discussed. A brief overview of the technology assessment function and some past experiences are given. Fragmentation of assessment systems, optimum social subsystem for examination in particular assessments, and adequacy of assessments are studied. The magnitude of the technology assessment function and the level of support required for the effective performance of this function are also discussed. One type of institutional arrangement which might produce a close approximation to the total problem assessment approach is suggested. N.E.N.

N72-22964* National Transportation Safety Board, Washington, D.C.
PROCESSES OF TECHNOLOGY ASSESSMENT: THE NATIONAL TRANSPORTATION SAFETY BOARD
Ernest Weiss *In* George Washington Univ. Technol. Assessment: Understanding the Social Consequences of Technol. Appl. 1972 p 229-258 refs
Avail: Praeger Publishers, 111 4th Ave., New York, N. Y. 10003 CSCL 05K

The functions and operations of the Safety Board as related to technology assessment are described, and a brief history of the Safety Board is given. Recommendations made for safety in all areas of transportation and the actions taken are listed. Although accident investigation is an important aspect of NTSB's activity, it is felt that the greatest contribution is in pressing for development of better accident prevention programs. Efforts of the Safety Board in changing transportation technology to improve safety and prevent accidents are illustrated. N.E.N.

N72-22970*# Northwestern Univ., Evanston, Ill. Dept. of Political Science.
PATTERNS IN THE DEVELOPMENT OF OPERATIONS RESEARCH AND MANAGEMENT SCIENCE IN GOVERNMENT Interim Paper
Michael J. White Sep. 1971 55 p refs Presented at the 1971 Ann. Meeting of the Am. Political Sci. Assoc., Chicago, 11 Sep. 1971
(Grant NGL-14-007-058)
(NASA-CR-126132; Publ-13-71) Avail: NTIS CSCL 05A

The development of an operations research or management science (OR/MS) activity in an organization is discussed as occurring in a series of phases. Organizational aspects of the development of OR/MS in an individual case and in an institutional environment of federal civilian agencies are described. It is noted that there is some evidence that the length of time it takes an OR/MS group to develop to maturity has decreased. It is concluded that to understand the development of OR/MS in government organization, it must be considered as a problem in empirical organization theory. N.E.N.

N72-22974*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PRESENT-VALUE ANALYSIS: A SYSTEMS APPROACH TO PUBLIC DECISIONMAKING FOR COST EFFECTIVENESS
Theodore T. Herbert 20 Aug. 1971 48 p refs
(NASA-TM-X-64653) Avail: NTIS CSCL 05C

Decision makers within Governmental agencies and Congress must evaluate competing (and sometimes conflicting) proposals which seek funding and implementation. Present value analysis can be an effective decision making tool by enabling the formal evaluation of the effects of competing proposals on efficient national resource utilization. A project's costs are not only its direct disbursements, but its social costs as well. How much does it cost to have those funds diverted from their use and economic benefit by the private sector to the public project? Comparisons of competing projects' social costs allow decision makers to expand their decision bases by quantifying the projects' impacts upon the economy and the efficient utilization of the country's limited national resources. A conceptual model is established for the choosing of the appropriate discount rate to be used in evaluation decisions through the technique. Author

N72-22978# National Science Foundation, Washington, D.C. National Science Board.
THE ROLE OF ENGINEERS AND SCIENTISTS IN A NATIONAL POLICY FOR TECHNOLOGY
1972 54 p refs
(NSB-72-1) Avail: SOD $0.45

Recommendations are summarized for policies of government aid supporting industrial technology, technical support for public goods and services, exploration of future alternatives, public understanding of technology, and technical assessment. Federal and company shares of industrial research and development spending for 1953 through 1972, trends in U.S. trade, and inventive contributions of independent inventors and small organizations are also cited. J.A.M.

N72-22979# Joint Publications Research Service, Arlington, Va.
MANAGERIAL SCIENCE AND THE NATIONAL ECONOMY
30 Mar. 1972 16 p Transl. into ENGLISH from Nauka i Zhizn. (Moscow), no. 1, 1972 p 2-7
(JPRS-55593) Avail: NTIS

A collection of magazine articles dealing with the role of computers, mathematical models, and human factors in national economic management are presented. The development of a national management system is examined. E.H.W.

N72-22987# California Univ., Irvine. Public Policy Research Organization.
SCIENCE AT THE SERVICE OF GOVERNMENT: CALIFORNIA TRIES TO EXPLOIT AN UNNATURAL RESOURCE
Robert E. Bickner 2 Dec. 1971 34 p refs
(Grant NSF GR-51)
(PB-205992) Avail: NTIS CSCL 05A

Responsible government officials and scientists in California are aware that better mechanisms for applying scientific information and analysis to public problems are needed, and they are committed to the discovery and utilization of such mechanisms. To illustrate the variety of recent efforts to translate scientific analyses into public policies, two California experiments are described: the so-called aerospace studies and the more recent assembly science and technology advisory council. The comparative advantages of two other sources of scientific advice: the not-for-profit research organizations, or think tanks, and the universities are also considered. GRA

N72-23029# Northrop Corp., Palos Verdes Estates, Calif. Electronics Div.
CONCEPT FORMULATION STUDY FOR AUTOMATIC INSPECTION, DIAGNOSTIC AND PROGNOSTIC SYSTEMS (AIDARS), VOLUME 1 Interim Report
Jul. 1971 77 p refs
(Contract DAAJ01-71-C-0503; DA Proj. 1F1-64204-DC-32)
(AD-736754; NORT-71-229-Vol-1; USAAVSCOM-TR-72-2-Vol-1; IR-2-Vol-1) Avail: NTIS CSCL 01/3

The report consists of the plan of analysis which describes the models and procedures to be used to perform the trade-offs during Phase C of the Concept Formulation Study for Automatic Inspection, Diagnostic and Prognostic Systems (AIDAPS) for Army aircraft. Section 2.0 describes the AIDAPS/aircraft maintenance analysis and effectiveness model. Section 3.0 presents the AIDAPS system procurement cost model. Section 4.0 discusses the AIDAPS system cost benefit model which compares the life cycle of AIDAPS equipped versus non-AIDAPS equipped aircraft. Section 5.0 references an aircraft maintenance operation model which shall be used in conjunction with the models described in Section 2.0. Section 6.0 presents a summary of the manner in which the optimum system will be selected. Author (GRA)

N72-23030# Northrop Corp., Palos Verdes Estates, Calif. Electronics Div.
CONCEPT FORMULATION STUDY FOR AUTOMATIC INSPECTION, DIAGNOSTIC AND PROGNOSTIC SYSTEMS (AIDAPS), VOLUME 2 Interim Report
Jul. 1971 282 p refs
(Contract DAAJ01-71-C-0503; DA Proj. 1F1-64204-DC-32)
(AD-736755; NORT-71-209-2-Vol-2; USAAVSCOM-TR-72-2-Vol-2; IR-2-Vol-2) Avail: NTIS CSCL 01/3

The report represents the second interim report prepared as part of the concept formulation study for Automatic Inspection, Diagnostic and Prognostic Systems (AIDAPS) for Army aircraft. The principal objective of this Phase B effort is the identification of AIDAPS technical approaches and concepts that fall within the engineering feasibility limitations established in Phase A. Author (GRA)

N72-23069*# Research Triangle Inst., Durham, N.C.
ADVANCEMENTS IN MEDICINE FROM AEROSPACE RESEARCH
F. Thomas Wooten *In its* Appl. of Aerospace Tech. in Biol. and Med. Dec. 1971 10 p Presented at Conf. on Space for Mankind's Benefit, Huntsville, Ala., 16-19 Nov. 1971

Avail: NTIS HC $7.50 CSCL 06E

NASA has taken the lead in implementing the concept of technology utilization, and the Technology Utilization Program is the first vital step in the goal of a technological society to insure maximum benefit from the costs of technology. Experience has shown that the active approach to technology transfer is unique and is well received in the medical profession when appropriate problems are tackled. The problem solving approach is a useful one at the precise time when medicine is recognizing the need for new technology. Author

N72-23095# Lincoln Lab., Mass. Inst. of Tech., Lexington.
EDUCATIONAL TECHNOLOGY PROGRAM Quarterly Technical Summary Report, 1 Sep. - 30 Nov. 1971
Frederick C. Frick 15 Dec. 1971 15 p
(Contract F19628-70-C-0230; AF Proj. 649L)
(AD-736030; ESD-TR-71-320) Avail: NTIS CSCL 05/9

The first three of the prototype terminals that will be used in the field tests at Keesler Air Force Base were completed and are being operated in full system shakedown tests. The microfiche production facility has been completed, and preparation and production of lesson materials for the Keesler Trial are proceeding on schedule. Author (GRA)

N72-23160# Analytics, Inc., Arlington, Va.
AN INVESTIGATION INTO SOFTWARE STRUCTURES FOR MAN/MACHINE INTERACTIONS Final Technical Report
Richard M. Nicholson, Bryan D. Wiggans, and Carl A. Silver Feb. 1972 88 p
(Contract N00014-71-C-0283; NR Proj. 196-103)
(AD-737266) Avail: NTIS CSCL 09/2

The current trend in command and control/information systems within the Navy, toward greater use of interactive capabilities, has the effect of bringing the true 'user'--the decision-maker--into direct contact with the system, rather than using a programmer as an intermediary. It is therefore necessary that the system designer orient the man/machine communication less toward his own programming community and more toward a user whose familiarity with computer devices and terminology is somewhat less than his own. For a clear view of the typical user and the functions he and the system perform, a survey of recent Navy systems is described. A review of the literature in information systems to determine the availability of information useful to the system designer in interactive software performance is presented. Finally, a research program to derive the needed information is proposed. Author (GRA)

N72-23502# *Joint Publications Research Service, Washington, D.C.*
MECHANICS: THE AGELESS SCIENCE
Ye. P. Moskatov 27 Apr. 1972 15 p Transl. into ENGLISH from Nauka i Zhizn (Moscow), no. 2, Feb. 1972 p 50-59
(JPRS-55819) Avail: NTIS HC $3.00

The organization and operation of the Institute of Problems of Mechanics of the Russian Academy of Sciences are discussed. Parts of the organization which are described are: (1) laboratory for mechanics of plasma, (2) laboratory for mechanics of polymers, (3) department of optimal control of motion, (4) shock wave laboratory, and (5) laboratory for the mechanics of anomalous liquids. Author

N72-23547# Joint Publications Research Service, Washington, D.C.
SEVERAL PROBLEMS IN ECONOMIC REFORM AT NONFERROUS METALLURGICAL ENTERPRISES

A. K. Doyev and I. A. Biryukov *In its* Bull. of the Inst. of Higher Learning, Nonferrous Met. 4 May 1972 p 153-158

Avail: NTIS HC $4.75

Successful conversion to economic reform involves solving the most important methodological and organizational questions, one of which is the construction of a valid system of economic incentives and their utilization at maximal efficiency for increasing the productivity of labor, improving the quality of the manufactured products, and increasing the profitability of production. The basic sources for establishing types of economic incentives are wage funds and economic incentive funds, as well as prizes for mastering new techniques, for suggestions on efficiency and invention, for scrap metal delivery, and on results of socialist competition. The four-year experiment in working at a metallurgy plant under the new conditions of planning and economic incentive shows possibilities. Author

N72-23968* National Aeronautics and Space Administration, Washington, D.C.
USEFUL NEW TECHNOLOGY Technology Utilization Program
1971 17 p
(NASA-TM-X-67699) Avail: NASA Scientific and Technical Information Facility, P. O. Box 33, College Park, Md. 20740 CSCL 05B

An information booklet on the Technology Utilization program is presented. Industrial benefits, how to obtain technological data, special publications, Regional Dissemination Centers, multidisciplinary application teams, interagency activities, and patents and licenses are described briefly. N.E.N.

N72-23969*# Ultrasystems, Inc., Newport Beach, Calif.
AEROSPACE MANPOWER TRANSFER TO SMALL BUSINESS ENTERPRISES Final Report, Aug. 1971 - Mar. 1972
Malcolm K. Green Mar. 1972 111 p
(Contract NASw-2274)
(NASA-CR-126528; USI-CS-722) Avail: NTIS HC $7.75 CSCL 05C

The feasibility of a program to effect transfer of aerospace professional people from the ranks of the unemployed into gainful employment in the small business community was investigated. The effectiveness of accomplishing transfer of technology from the aerospace effort into the private sector through migration of people rather than products or hardware alone was also studied. Two basic methodologies were developed. One involves the matching of ex-aerospace professionals and small companies according to their mutual needs. A training and indoctrination program is aimed at familiarizing the professional with the small company environment, and a program of follow-up counseling is defined. The second methodology incorporates efforts to inform and arouse interest among the nonaerospace business community toward affirmative action programs that will serve mutual self-interests of the individuals, companies, and communities involved. Author

N72-23973*# George Washington Univ., Washington, D.C.
SOCIAL IMPACTS OF CIVIL AVIATION AND IMPLICATIONS FOR R AND D POLICY Technical Report, Apr. 1970 - Apr. 1971
Louis H. Mayo Sep. 1971 223 p refs Sponsored jointly by DOT
(Contract NSR-09-010-069)
(NASA-CR-1988; DOT-TST-10-6) Avail: NTIS HC $3.00 CSCL 05K

An attempt was made to identify social impacts, both beneficial and detrimental, which would or could flow from the introduction of advanced civil aviation systems. A broad range of social impact areas was investigated which included economic, environmental, political, sociological, psychological, legal, and urban/regional developmental factors. Data are arranged into two major parts. In the first part, a series of Major Policy Issues are identified and discussed which appear, on the basis of the social impact study, to merit serious consideration. The discussion of each 'Issue' is presented both to explain its relevance and to raise considerations which will bear on its satisfactory resolution. The second part views the same overall body of information in a different manner: a series of 'Findings' are pointed out from which more concrete guidance for R and D policy can be derived, and a set of 'Candidate Basic Federal Undertakings' thus derived are presented. Author

N72-23978# National Science Foundation, Washington, D.C. Government Studies Group.
SCIENCE RESOURCES STUDIES HIGHLIGHTS: FUNCTIONS OTHER THAN DEFENSE AND SPACE SHOW RISING SHARE IN FEDERAL R AND D EXPENDITURES
25 Apr. 1972 4 p
(NSF-72-305) Avail: NTIS HC $3.00 CSCL 05A

In the 1963-73 period the 10 budget functions other than national defense and space research and technology have registered an upward shift in R and D program emphasis. Until 1966 national defense and space research and technology represented 90 percent of the Federal R and D expenditure total. Since then the joint share of these two functions has decreased both relatively and absolutely to an expected 77 percent of the Federal R and D total in fiscal year 1973. The share of the other 10 functions has risen steadily, gaining 5 percentage points between 1970 and 1973 alone. Author

N72-24093*# George Washington Univ., Washington, D.C.
THE PUBLIC HEALTH SERVICE GUIDELINES. GOVERNING RESEARCH INVOLVING HUMAN SUBJECTS: AN ANALYSIS OF THE POLICY-MAKING PROCESS
Mark S. Frankel Feb. 1972 69 p refs
(Grant NGL-09-010-030)
(NASA-CR-126642; GWPS-Mon-10) Avail: NTIS HC $5.50 CSCL 05E

The policy making process which led to development of the Public Health Service Guidelines governing research involving human subjects is outlined. Part 1 examines the evolution of PHS Guidelines, tracing (1) evolution of thought and legal interpretation regarding research using human subjects; (2) initial involvement of the Federal government; (3) development of the government's research program; (4) the social-political environment in which formal government policy was developed; and (5) various policy statements issued by the government. Part 2 analyzes the process by which PHS Guidelines were developed and examines the values and other underlying factors which contributed to their development. It was concluded that the evolution of the Guidelines is best understood within the context of a mixed-scanning strategy. In such a strategy, policy makers make fundamental decisions regarding the basic direction of policy and subsequent decisions are made incrementally and within the contexts set by the original fundamental decisions. Author

N72-24208*# National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
A BIBLIOGRAPHICAL SURVEYS OF LARGE-SCALE SYSTEMS
William R. Corliss 15 Jan. 1970 50 p refs
(NASA-TM-X-68343) Avail: NTIS HC $4.50 CSCL 09B

A limited, partly annotated bibliography was prepared on the subject of large-scale system control. Approximately 400 references are divided into thirteen application areas, such as large societal systems and large communication systems. A first-author index is provided. Author

N72-24215# Select Committee on Small Business (U. S. Senate).
INTRODUCTION TO NUMERICAL CONTROL
Washington GPO 1971 233 p refs Hearing before Select Comm. on Small Business, 92d Congr., 1st Sess., 24 Jun. 1971 and a study on the Impact of Numerical Control of Small Business prepared by the Small Business Admin., 26 Jul. 1971
Avail: SOD $ 1.00

Computer techniques for numerical control of manufacturing processes and their impact on the depressed state of small aerospace and machine tool industries are discussed. G.G.

N72-24918*# Martin Marietta Corp., Denver, Colo.
METHODOLOGY FOR THE SYSTEMS ENGINEERING PROCESS. VOLUME 2: TECHNICAL PARAMETERS
James H. Nelson Mar. 1972 45 p
(Contract NAS8-27567)
(NASA-CR-61381; MCR-71-352) Avail: NTIS HC $4.25 CSCL 22B

A scheme based on starting the logic networks from the development and mission factors that are of primary concern in an aerospace system is described. This approach required identifying the primary states (design, design verification, premission, mission, postmission), identifying the attributes within each state (performance capability, survival, evaluation, operation, etc), and then developing the generic relationships of variables for each branch. To illustrate this concept, a system was used that involved a launch vehicle and payload for an earth orbit mission. Examination showed that this example was sufficient to illustrate the concept. A more complicated mission would follow the same basic approach, but would have more extensive sets of generic trees and more correlation points between branches. It has been shown that in each system state (production, test, and use), a logic could be developed to order and classify the parameters involved in the translation from general requirements to specific requirements for system elements. Author

N72-24976# Joint Publications Research Service, Arlington, Va.
SCIENCE OF ORGANIZATION AND ORGANIZATION OF SCIENCE
A. A. Malinovskiy 4 May 1972 19 p refs Transl. into ENGLISH from Priroda (Moscow), no. 3, 1972 p 42-49
(JPRS-55883) Avail: NTIS HC $3.00

Attention is being given lately to the search for the rational organization of the control of complex systems such as an enterprise, a system of interdependent enterprises, an industry, or a collection of people occupied in a common business. All these questions, roughly speaking, may be divided into two groups: qualitative and quantitative consideration of the management processes. Author

N72-24978*# George Washington Univ., Washington, D.C.
GENERATING SOCIAL IMPACT SCENARIOS, A KEY STEP IN MAKING TECHNOLOGY ASSESSMENT STUDIES
Martin V. Jones (Mitre Corp.) Apr. 1972 24 p refs
(Grant NGL-09-010-030)
(NASA-CR-126643; GWPS-Mon-11) Avail: NTIS HC $3.25 CSCL 05K

The social impact scenario, a method used to trace the effects of new technological applications, is discussed. The research seeks to anticipate the secondary social impacts that arise from: (1) government or private programs that cope with major social problems like poverty, environmental pollution, or public safety; and (2) a concerted national effort to achieve a widely supported specific goal like landing a man on the moon or finding a cure for cancer. Author

N72-24987# Centre National d'Etudes Spatiales, Paris (France).
GENERAL INSTRUCTION CONCERNING QUALITY REQUIREMENTS OF MATERIALS USED IN BALLISTICS AND SPACE [INSTRUCTION GENERALE RELATIVE AUX EXIGENCES DE QUALITE POUR LES MATERIELS A USAGE BALISTIQUE ET SPATIAL]
Jul. 1971 72 p In FRENCH Prepared jointly with Direc. Tech. des Eng.
(CNES/QFT/IN-0001; DTEN/STEN/QM-1088) Avail: NTIS HC $5.75

Quality assurance procedures to be used by contractors in order to guarantee the quality necessary for aerospace equipment are defined. The following topics are treated in relation to quality assurance: level of personnel involved, technical documentation, product identification, suppliers, manufacturing methods, inspections and tests, nonconforming products, time schedules, maintenance, stocks, materials handling, and sampling.
Author (ESRO)

N72-25223*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
APOLLO EXPERIENCE REPORT: REAL-TIME AUXILIARY COMPUTING FACILITY DEVELOPMENT
Charles E. Allday Washington Jun. 1972 13 p
(NASA-TN-D-6855; MSC-S-326) Avail: NTIS HC $3.00 CSCL 09B

The Apollo real time auxiliary computing function and facility were an extension of the facility used during the Gemini Program. The facility was expanded to include support of all areas of flight control, and computer programs were developed for mission and mission-simulation support. The scope of the function was expanded to include prime mission support functions in addition to engineering evaluations, and the facility became a mandatory mission support facility. The facility functioned as a full scale mission support activity until after the first manned lunar landing mission. After the Apollo 11 mission, the function and facility gradually reverted to a nonmandatory, offline, on-call operation because the real time program flexibility was increased and verified sufficiently to eliminate the need for redundant computations. The evaluation of the facility and function and recommendations for future programs are discussed in this report. Author

N72-25955*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
APPLICABILITY OF NASA CONTRACT QUALITY MANAGEMENT AND FAILURE MODE EFFECT ANALYSIS PROCEDURES TO THE USGS OUTER CONTINENTAL SHELF OIL AND GAS LEASE MANAGEMENT PROGRAM
Morris K. Dyer, Dewey G. Little, Earl G. Hoard, Alfred C. Taylor, and Rayford Campbell Washington Jun. 1972 43 p refs
(NASA-TM-X-2567) Avail: NTIS HC $3.00 CSCL 05A

An approach that might be used for determining the applicability of NASA management techniques to benefit almost any type of down-to-earth enterprise is presented. A study was made to determine the following: (1) the practicality of adopting NASA contractual quality management techniques to the U.S. Geological Survey Outer Continental Shelf lease management function; (2) the applicability of failure mode effects analysis to the drilling, production, and delivery systems in use offshore; (3) the impact on industrial offshore operations and onshore management operations required to apply recommended NASA techniques; and (4) the probable changes required in laws or regulations in order to implement recommendations. Several management activities that have been applied to space programs are identified, and their institution for improved management of offshore and onshore oil and gas operations is recommended.
Author

N72-25958# National Transportation Safety Board, Washington, D.C.
[FUNCTIONS, POWERS, DUTIES, AND CONTRIBUTIONS OF THE NATIONAL TRANSPORTATION SAFETY BOARD]

Isabel A. Burgess 15 Dec. 1972 11 p refs Presented at Luncheon Meeting of the Cleveland Men's Club of Washington, D. C., 15 Dec. 1971
Avail: NTIS HC $3.00

A description is given of the National Transportation Safety Board and its functions in preventing accidents; the powers and duties of the Board are also given. The Board analyzes transportation systems, identifies possible hazards in the system, and offers methods for eliminating these hazards before operation of the system is started. The cause of accidents, and safety recommendations for preventing recurrence of such accidents are investigated and published by the Board. E.H.W.

N72-25961*# National Aeronautics and Space Administration, Washington, D.C.
GOVERNMENT-INDUSTRY SYSTEM SAFETY CONFERENCE
28 May 1971 283 p refs Conf. held at Greenbelt, Md., 26-28 May 1971
(NASA-TM-X-68369) Avail: NTIS HC $16.25 CSCL 13L

Conference papers are presented relating to all aspects of the systems approach to safety and its application in governmental and industrial projects.

N72-25962*# National Aeronautics and Space Administration, Washington, D.C.
COMMUNICATING THE RISK
Raymond M. Wilmotte *In its* Govt.-Ind. System Safety Conf. 28 May 1971 p 23-35 ref
Avail: NTIS HC $16.25 CSCL 13L

The balance between benefits and risk is discussed from the standpoint of the decision or policy making process. The basic premise of the discussion is that applied technology may be divided into two parts: (1) benefit oriented technology which includes design, development, manufacturing or construction, and operations; and (2) risk or uncertainty technology which includes safety, reliability, quality assurance, test, and maintenance. Whereas the primary emphasis of the discussion is placed on the importance of a balance in the application of these technologies, arguments are presented which indicate that risk technologies lag far behind benefit technologies. In addition, existing conditions and pressures are described which lead to underestimating risk. The importance is stressed of developing a better sense of the advantages that knowledge of risk could provide via the decision making process. It is suggested that by experiment and analysis on the effects of increasing the contribution of risk technologies, a better understanding of their potentiality and limitations would result. D.L.G.

N72-25963*# Interior Dept., Washington, D.C. Div. of Safety Management.
SYSTEM SAFETY MANAGEMENT: A NEW DISCIPLINE
W. C. Pope *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 37-40 refs
Avail: NTIS HC $16.25 CSCL 13L

The systems theory is discussed in relation to safety management. It is suggested that systems safety management, as a new discipline, holds great promise for reducing operating errors, conserving labor resources, avoiding operating costs due to mistakes, and for improving managerial techniques. It is pointed out that managerial failures or system breakdowns are the basic reasons for human errors and condition defects. In this respect, a recommendation is made that safety engineers stop visualizing the problem only with the individual (supervisor or employee) and see the problem from the systems point of view. D.L.G.

N72-25964*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DATA REQUIREMENTS ANALYSIS IN SUPPORT OF SYSTEM SAFETY
Irving Pinkel *In its* Govt.-Ind. System Safety Conf. 28 May 1971 p 41-47
Avail: NTIS HC $16.25 CSCL 13L

The development of a user-oriented safety data bank is reported and its data requirements are outlined. The information retrieval system employed is described along with the problems involved in its establishment and operation. D.L.G.

N72-25965*# National Aeronautics and Space Administration, Washington, D.C.
REFLECTIONS ON SYSTEM SAFETY AND THE LAW
Daniel F. Hayes, Sr. *In its* Govt.-Ind. System Safety Conf. 28 May 1971 p 49-56 refs
Avail: NTIS HC $16.25 CSCL 13L

The application of law to the determination of what constitutes safeness is discussed. The numerous factors are analyzed which enter into the decisions of courts in deciding what is safe and what is unsafe. It is pointed out that as technology changes, legal interpretations of safety also change. Arguements are given for the use of system safety techniques and better engineering analyses as instruments of defense against liability. D.L.G.

N72-25966*# Hughes Aircraft Co., Culver City, Calif. Senior Technical Staff.
WHY SYSTEM SAFETY PROGRAMS CAN FAIL
Willie Hammer *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 59-64 refs
Avail: NTIS HC $16.25 CSCL 13L

Factors that cause system safety programs to fail are discussed from the viewpoint that in general these programs have not achieved their intended aims. The one item which is considered to contribute most to failure of a system safety program is a poor statement of work which consists of ambiguity, lack of clear definition, use of obsolete requirements, and pure typographical errors. It is pointed out that unless safety requirements are stated clearly, and where they are readily apparent as firm requirements, some of them will be overlooked by designers and contractors. The lack of clarity is stated as being a major contributing factor in system safety program failure and usually evidenced in: (1) lack of clear requirements by the procuring activity, (2) lack of clear understanding of system safety by other managers, and (3) lack of clear methodology to be employed by system safety engineers. D.L.G.

N72-25967*# Army Board for Aviation Accident Research, Fort Rucker, Ala.
THE PRACTICAL APPLICATION OF MISHAP DATA IN ARMY AIRCRAFT SYSTEM SAFETY PROGRAMS
James T. Darrah, Jr. *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 65-73 ref
Avail: NTIS HC $16.25 CSCL 13L

The means are discussed by which the United States Army Board for Aviation Accident Research (USABAAR) now utilizes the vast store of historical accident data in the application of the system safety concept for developmental aircraft. USABAAR serves as the central agency for the Army Accident Prevention Program which includes the receipt, processing, and analysis of all data and information related to Army aircraft accident experience. It is pointed out that methods which served the cause of accident prevention so well in the past are no longer adequate and that traditional parameters used to measure mishap experience have become obsolete. USABAAR has

developed, and recently put into use, completely revised accident reporting forms which greatly expand the scope and detail of information provided as a result of investigation. This and other factors which have resulted in an improved data system are discussed in detail. D.L.G.

N72-25968*# Air Registration Board, London (England).
SOME THOUGHTS ABOUT SYSTEM SAFETY ASSESSMENT AND ITS CURRENT APPLICATION IN AEROSPACE
Peter R. Allison *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 75-85 ref

Avail: NTIS HC $16.25 CSCL 13L
The various issues and requirements which must be considered during the actual work of safety assessment are discussed. The task and its objectives are considered and the importance of presentation is stressed, so that problems and their solution are displayed adequately to the many disciplines involved. The definition of areas of influence to which the requirements can be applied, and safety objectives derived, is also discussed. Emphasis is placed on the need to determine and set out safety objectives with precision so that the analysis is not complicated with occurrences which are not relevant to safety. D.L.G.

N72-25970*# University of Southern Calif., Los Angeles.
SYSTEM SAFETY EDUCATION FOCUSED ON FLIGHT SAFETY
Eugene Holt *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 101-106
Avail: NTIS HC $16.25 CSCL 13L
The measures necessary for achieving higher levels of system safety are analyzed with an eye toward maintaining the combat capability of the Air Force. Several education courses were provided for personnel involved in safety management. Data include: (1) Flight Safety Officer Course, (2) Advanced Safety Program Management, (3) Fundamentals of System Safety, and (4) Quantitative Methods of Safety Analysis. E.H.W.

N72-25971*# Texas A&M Univ., College Station.
SYSTEM SAFETY EDUCATION FOCUSED ON INDUSTRIAL ENGINEERING
W. L. Johnston and R. S. Morris *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 108-111

Avail: NTIS HC $16.25 CSCL 13L
An educational program, designed to train students with the specific skills needed to become safety specialists, is described. The discussion concentrates on application, selection, and utilization of various system safety analytical approaches. Emphasis is also placed on the management of a system safety program, its relationship with other disciplines, and new developments and applications of system safety techniques. E.H.W.

N72-25972*# George Washington Univ., Washington, D.C.
SYSTEM SAFETY EDUCATION FOCUSED ON SYSTEM MANAGEMENT
Vernon L. Grose *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 113-126 refs

Avail: NTIS HC $16.25 CSCL 13L
System safety is defined and characteristics of the system are outlined. Some of the principle characteristics include role of humans in hazard analysis, clear language for input and output, system interdependence, self-containment, and parallel analysis of elements. E.H.W.

N72-25973*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CONTRACTING FOR SYSTEM SAFETY
Leslie W. Ball *In its* Govt.-Ind. System Safety Conf. 28 May 1971 p 129-136
Avail: NTIS HC $16.25 CSCL 13L
Data are given concerning the safety requirements that are, or should be, part of the hierachy of the contractual relationship between government and prime contractors, prime and subcontractors, and subcontractors and vendors. Author

N72-25974*# National Transportation Safety Board, Washington, D.C.
REQUIREMENTS FOR SYSTEMS SAFETY PROGRAMS AS DELINEATED BY MIL-STD-882
C. O. Miller *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 137-146 refs

Avail: NTIS HC $16.25 CSCL 13L
A specialized approach, based on MIL-STD-882, to recommended safety features of an air safety program for aircraft manufacturers, is summarized. E.H.W.

N72-25975*# Boeing Co., Seattle, Wash.
INTEGRATING SYSTEM SAFETY INTO THE BASIC SYSTEMS ENGINEERING PROCESS
John W. Griswold *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 147-160 refs

Avail: NTIS HC $16.25 CSCL 13L
The basic elements of a systems engineering process are given along with a detailed description of what the safety system requires from the systems engineering process. Also discussed is the safety that the system provides to other subfunctions of systems engineering. E.H.W.

N72-25976*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
THE VIKING PROJECT SAFETY PROGRAM
Donald H. Ward *In its* Govt.-Ind. System Safety Conf. 28 May 1971 p 163-169
Avail: NTIS $16.25 CSCL 13L
The safety requirements and the management of these requirements for the Viking Project are given. Potential hazards are identified and ways of reducing or providing a sound confidence limit are analyzed. E.H.W.

N72-25977*# North American Rockwell Corp., Downey, Calif. Div. Safety.
SYSTEM SAFETY IN THE OPERATIONAL PHASE
John Gera, Sr. *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 171-175
Avail: NTIS HC $16.25 CSCL 13L
The operational phase of system safety is investigated. Data cover manufacturing, test operations, materials handling, flight tests, and operational mission analysis. E.H.W.

N72-25978*# Grumman Aerospace Corp., Bethpage, N.Y. LM Safety.
LUNAR MODULE PROGRAM SYSTEM SAFETY
William E. Scarborough *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 177-182

Avail: NTIS HC $16.25 CSCL 13L

The application of system safety principles to the Lunar Module Program is summarized. Objectives of the program include elimination or reduction of risk to personnel, material, and facilities resulting from failures or malfunctions in hardware or procedures. Data also cover design, production, and test activity. E.H.W.

N72-25979*# Martin Marietta Corp., Denver, Colo. Systems Safety.
SYSTEM SAFETY IN MANNED VERSUS UNMANNED PROGRAMS
George B. Mumma *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 185-193

Avail: NTIS HC $16.25 CSCL 13L
The differences in applying system safety techniques to manned and unmanned spacecraft are outlined. The Skylab Earth Orbiting Laboratory and the Viking Mars Lander were compared. Common aspects, differences, and mission objectives are used as major criteria in developing a safety procedure. E.H.W.

N72-25981*# Idaho Nuclear Corp., Idaho Falls. Computer Science Branch.
FAULT TREE APPLICATIONS WITHIN THE SAFETY PROGRAM OF IDAHO NUCLEAR CORPORATION
W. E. Vesely *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 209-219 refs

Avail: NTIS HC $16.25 CSCL 13L
Computerized fault tree analyses are used to obtain both qualitative and quantitative information about the safety and reliability of an electrical control system that shuts the reactor down when certain safety criteria are exceeded, in the design of a nuclear plant protection system, and in an investigation of a backup emergency system for reactor shutdown. The fault tree yields the modes by which the system failure or accident will occur, the most critical failure or accident causing areas, detailed failure probabilities, and the response of safety or reliability to design modifications and maintenance schemes. G.G.

N72-25982*# National Bureau of Standards, Washington, D.C.
CONSUMER PRODUCT SAFETY: A SYSTEMS PROBLEM
Carl C. Clark *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 221-232 refs

Avail: NTIS HC $16.25 CSCL 13L
The manufacturer, tester, retailer, consumer, repairer disposer, trade and professional associations, national and international standards bodies, and governments in several roles are all involved in consumer product safety. A preliminary analysis, drawing on system safety techniques, is utilized to distinguish the inter-relations of these many groups and the responsibilities that they are or could take for product safety, including the slow accident hazards as well as the more commonly discussed fast accident hazards. The importance of interactive computer aided information flow among these groups is particularly stressed.
Author

N72-25983*# National Transportation Safety Board, Washington, D.C. Railroad Safety Div.
APPLICATION OF SYSTEM SAFETY TO RAIL TRANSIT SYSTEMS
Thomas Dew Styles *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 233-239

Avail: NTIS HC $16.25 CSCL 13L
Management emphasis on system safety in the rapid transit industry includes the granting and use of funds by the Federal Government according to systematic analysis of safety hazards in advance. Likelihood predictions that those hazards will be activated by exposure of the system to a system failure, a human error, external conditions, or combinations of these aspects determine alternatives to the assumption of risk and recommend corrections before the system is operational. Rigorous safety analyses are projected to assure operational safety for prolonged periods under varied maintenance conditions; these analysis encompass station accident possibilities as well as train-person collisions, car equipment and design, traffic control systems, and tunnel design problems. G.G.

N72-25984*# National Highway Traffic Safety Administration, Washington, D.C. Office of Operating Systems.
DESIGNING FOR AUTO SAFETY
Elwood T. Driver *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 241-250

Avail: NTIS HC $16.25 CSCL 13L
Safety design features in the motor vehicle and highway construction fields result from systems analysis approach to prevent or lessen death, injury, and property damage results. Systems analysis considers the prevention of crashes, increased survivability in crashes, and prompt medical attention to injuries as well as other postcrash salvage measures. The interface of these system elements with the driver, the vehicle, and the environment shows that action on the vehicle system produces the greatest safety payoff through design modifications. New and amended safety standards developed through hazard analysis technique improved accident statistics in the 70's; these regulations include driver qualifications and countermeasures to identify the chronic drunken driver who is involved in more than two-thirds of all auto deaths. G.G.

N72-25985*# Litton Systems, Inc., Beverly Hills, Calif. Assurance Engineering.
INTEGRATING A MULTIFACETED SYSTEM SAFETY PROGRAM FOR A LARGE COMPLEX SYSTEM
W. W. Malasky *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 251-257 refs

Avail: NTIS HC $16.25 CSCL 13L
A safety systems effectiveness analysis is developed that considers the extent to which a system may be expected to achieve a set of stated system objectives by determining the interrelationships between reliability, maintainability, quality assurance, human factors, and value engineering. G.G.

N72-25986*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
RELIABILITY TECHNIQUES IN THE PETROLEUM INDUSTRY
Henry L. Williams *In its* Govt.-Ind. System Safety Conf. 28 May 1971 p 259-270
Avail: NTIS HC $16.25 CSCL 13L
Quantitative reliability evaluation methods used in the Apollo Spacecraft Program are translated into petroleum industry requirements with emphasis on offsetting reliability demonstration costs and limited production runs. Described are the qualitative disciplines applicable, the definitions and criteria that accompany the disciplines, and the generic application of these disciplines to the chemical industry. The disciplines are then translated into proposed definitions and criteria for the industry, into a base-line reliability plan that includes these disciplines, and into application notes to aid in adapting the base-line plan to a specific operation. G.G.

N72-25987*# Grumman Aerospace Corp., Bethpage, N.Y.
SYSTEM SAFETY ENGINEERING IN THE DEVELOPMENT OF ADVANCED SURFACE TRANSPORTATION VEHICLES
Harry E. Arnzen *In* NASA, Washington Govt.-Ind. System Safety Conf. 28 May 1971 p 271-292 refs

Avail: NTIS HC $16.25 CSCL 13L

Applications of system safety engineering to the development of advanced surface transportation vehicles are described. As a pertinent example, the paper describes a safety engineering efforts tailored to the particular design and test requirements of the Tracked Air Cushion Research Vehicle (TACRV). The test results obtained from this unique research vehicle provide significant design data directly applicable to the development of future tracked air cushion vehicles that will carry passengers in comfort and safety at speeds up to 300 miles per hour. Author

N72-25988*# National Aeronautics and Space Administration, Washington, D.C.
OBSERVATIONS AND REFLECTIONS
Jerome Lederer *In its* Govt.-Ind. System Safety Conf. 28 May 1971 p 293-299 refs
Avail: NTIS HC $16.25 CSCL 13L

The aspects of software as well as hardware in application of system safety to nuclear safety, consumer product safety, rail transit safety, auto safety, petroleum safety, and advanced surface transport safety are emphasized. The possibility of product liability as a forcing function to stimulate adoption of system safety analysis is projected. G.G.

N72-25991# Research Analysis Corp., McLean, Va.
SELECTED MILITARY APPLICATIONS OF NONLINEAR PROGRAMMING
Arnold P. Jones, ed. Feb. 1972 79 p refs
(Contract DAHC19-69-C-0017)
(AD-738118; RAC-TP-439) Avail: NTIS CSCL 12/2

The paper presents a technical discussion of several military applications of nonlinear programming (NLP) that have been made by RAC during the past decade. The mathematical presentations included in the paper enable the reader, who has some general familiarity with NLP, to acquire some facility in NLP modeling. Author (GRA)

N72-26024*# Lockheed-California Co., Burbank.
STUDY OF AIRCRAFT IN INTRAURBAN TRANSPORTATION SYSTEMS
E. G. Stout Washington NASA Mar. 1972 156 p refs
(Contract NAS2-5989)
(NASA-CR-1991) Avail: NTIS HC $3.00 CSCL 01B

A systems analysis was conducted to define the technical economic and operational characteristics of an aircraft transportation system for short-range intracity commuter operations. The analysis was for 1975 and 1985 in the seven county, Detroit, Michigan area. STOL and VTOL aircraft were studied in sizes from 40 to 120 passengers. The preferred vehicle for the Detroit area was the deflected slipstream STOL. Since the study was parametric in nature, it is applicable to generalization, and it was concluded that a feasible intraurban air transportation system could be developed in many viable situations. Author

N72-26153# Stanford Research Inst., Menlo Park, Calif.
ECONOMIC VIABILITY OF THE PROPOSED UNITED STATES COMMUNICATIONS SATELLITE SYSTEMS
Daniel S. Allan, John L. Bossert, and Lloyd I. Krause Oct. 1971 148 p refs
(Contract OTP-SE-72-103)
(PB-207398) Avail: NTIS HC $3.00 CSCL 17B

The potential outcomes of a policy of open entry into the domestic communications satellite industry is examined. It consists of an analysis based on demand, cost, technical, and performance data contained in the applications to the FCC. GRA

N72-26196# Joint Publications Research Service, Arlington, Va.
DECISION OF FIFTH ALL-UNION CONFERENCE ON CONTROL PROBLEMS
In its Mater. on Fifth All-Union Controls Conf. 13 Jun. 1972 p 51-56
Avail: NTIS HC $5.00

The research tasks recommended for national economic development by the conference on control problems are reported. The areas in which research should be conducted include: theory and methods for optimal control, new methods for synthesis of continuous and discrete control devices, theory of large systems, theoretical and applied research on long-range problems, standardized devices for the state system of instruments, and control of complex production and economic systems. F.O.S.

N72-26402# Central Electricity Generating Board, London (England).
QUALITY PROGRAMME MANAGEMENT: A SELECTIVE BIBLIOGRAPHY, 1962 - 1971
P. G. Williams, comp. Mar. 1972 13 p refs
(CE-Bib-221) Avail: NTIS HC $3.00

Quality engineering practice is reviewed with respect to significant characteristics of mission critical components. Methods of control are described that include integrity checks at progressive assembly stages. Typical control documents are included. Author

N72-26978*# California Univ., Los Angeles.
WORKSHOP ON DIMENSIONAL ANALYSIS FOR DESIGN, DEVELOPMENT, AND RESEARCH EXECUTIVES Summary Report
Richard Alan Goodman and William J. Abernathy Oct. 1971 60 p refs
(Contracts NSR-05-007-236-M1; N00014-69-C-0263)
(NASA-CR-127060) Avail: NTIS HC $5.00 CSCL 05A

The proceedings of a conference of research and development executives are presented. The purpose of the meeting was to develop an understanding of the conditions which are appropriate for the use of certain general management tools and those conditions which render these tools inappropriate. The verbatim statements of the participants are included to show the direction taken initially by the conference. Formal presentations of management techniques for research and development are developed. P.N.F.

N72-26980# Committee on Interstate and Foreign Commerce (U. S. House).
SETTLEMENT OF LABOR-MANAGEMENT DISPUTES IN TRANSPORTATION, PART 1
Washington GPO 1971 422 p refs Hearings on H.R. 3595, H.R. 3596, H.R. 2357, H.R. 5347, H.R. 8385, H.R. 9088, H.R. 9989, H.J.Res. 364 (and all identical bills) before Comm. on Interstate and Foreign Com., 92d Congr., 1st Sess., 27-29 Jul.; 3-4 Aug.; 14-16, 21, 28-30 Sep. 1971
Avail: Subcomm. on Transportation and Aeron.

The findings and recommendations of the Subcommittee on Transportation and Aeronautics of the U.S. House of Representatives concerning settlement of labor-management disputes in the transportation industry are presented. The report is composed mainly of testimony of witnesses before the

committee. The provisions of the bill to provide more effective means of protecting the public interest in national emergency disputes involving the transportation industry are included.
P.N.F.

N72-26981# Committee on Interstate and Foreign Commerce (U. S. House).
SETTLEMENT OF LABOR-MANAGEMENT DISPUTES IN TRANSPORTATION, PART 2
Washington GPO 1971 367 p refs Hearings on H.R. 3595, H.R. 3596, H.R. 2357, H.R. 5347, H.R. 8385, H.R. 9088, H.R. 9989, H.J.Res. 364 (and all identical bills) before Comm. on Interstate and Foreign Com., 92d Congr., 1st Sess., 27-29 Jul.; 3-4 Aug.; 14-16, 21; 28-30 Sep. 1971
Avail: Subcomm. on Transportation and Aeron.

The findings and recommendations of the Subcommittee on Transportation and Aeronautics of the U.S. House of Representatives concerning legislation for settlement of labor-management disputes in the transportation industry are presented. Summaries of legislative proposals are discussed. The testimonies of representatives of various industries are included. Analyses of government and industry efforts to reach agreements on the settlement of labor strikes are examined. P.N.F.

N72-26990# National Academy of Sciences-National Research Council, Washington, D.C. Highway Research Board.
AUTOMATION SYSTEMS FOR HIGHWAY ORGANIZATIONS Special Report 128
1972 133 p refs Proc. of the Western Summer Meeting, Austin, Tex., 16-18 Aug. 1971; sponsored by the Highway Res. Board and cosponsored by the Tex. Highway Dept. and Tex. Univ. Coll. of Eng.
(LC-72-80756; ISBN-0-309-01997-4) Avail: NTIS HC $8.75

The proceedings of the Highway Research Board conference held at Austin, Texas on August 16 through 18, 1971 are presented. The purpose of the conference was to stimulate interest in and advance the use of computer-based automation systems for highway organizations. Specific subjects presented were: (1) automation for making adminstrative and managerial decisions, (2) computer applications for design and construction of roads and related equipment, (3) development of administrative management information system, (4) automation techniques for traffic operations and highway maintenance, and (5) computer procedures for transportation planning and data collection.
Author

N72-27487 National Lending Library for Science and Technology, Boston Spa (England).
SAFETY IN THE RUNNING OF PLANT PRODUCING AND USING OXYGEN
W. Wessing 11 May 1972 20 p Transl. into ENGLISH from Maschinenschaden (Munich), v. 34, Aug. 1961 p 97-107
(NLL-CE-Trans-5849-(9022.09)) Avail: Natl. Lending Library, Boston Spa, Engl.: 2 NLL photocopy coupons

Industrial practices for the production of oxygen are discussed. The protection measures necessary for avoiding accidents and resulting damage are considered. Selection and training of operating staff and the individual protective equipment for the staff, layout of working area, dangerous impurities which may be present in the air, and dangers created by the presence of grease and oils are examined. The insulating materials, requirements for piping, valves and linings, and the equipment for monitoring operation and maintenance of the plant are described. Author

N72-27710# Little (Arthur D.), Inc., Cambridge, Mass.
ILLUSTRATIVE APPLICATIONS OF AIR TRAFFIC CONTROL SYSTEM CAPACITY STUDY METHODOLOGY Interim Report, Nov. 1970 - Sep. 1971
G. Raisbeck, J. L. Everett, and B. O. Koopman Nov. 1971 46 p refs
(Contract DOT-FA70WA-2141)
(AD-738892; FAA-RD-71-113) Avail: NTIS CSCL 17/7

The long-range objective of this program is to develop tools and techniques to define, measure, and predict the capacity of an air traffic control system, which can then be used in analytical studies in support of long-range plans, management decisions, and system performance evaluations. The method of approach in this contract provides for testing and refining these tools by using them in typical current problems. This report illustrates the application of these tools to five typical current problems: The origins of delays in aviation operations; Insensitivity of queue parameters to server statistics; Operational measurements in the terminal control area; Structuring cost-benefit methodology for ATC capacity improvement measures; and Establishing practical safety goals in air traffic control. GRA

N72-27983# RAND Corp., Santa Monica, Calif.
US TECHNOLOGY: DECLINE OR REBIRTH?
B. W. Augenstein Apr. 1972 17 p
(P-4806) Avail: NTIS HC $3.00

An analysis of the condition of technology in the United States at the present time is presented. It is concluded that there is a relative stagnation in both the service and manufacturing industries, but no single cause for this stagnation can be determined. Suggestions for generating new initiatives in the service industry in order to overcome the stagnation are submitted. Various applications of computer technology are proposed as a means to improve technology. The role of government in supporting research and development activities is discussed. P.N.F.

N72-27984# RAND Corp., Santa Monica, Calif.
CHOICE AMONG STRATEGIES FOR SYSTEM ACQUISITION
Alvin J. Hartman Mar. 1972 24 p refs Presented at Winter Meetings of the Econometric Soc., New Orleans, 27-29 Dec. 1971
(P-4794) Avail: NTIS HC $3.25

A model capturing the dimensions of and controls over an acquisition program is developed and analyzed. The model includes various dimensions of program performance, not only system performance and program schedule but also development and system cost as well as acquisition strategies, comprised of combinations of: (1) study, test, and demonstration activities: (2) contractor environments and contract types; and (3) sets of decision points for program, technological, or threat reassessment. Choice among strategies can be determined within a budget constraint by the utility of performance dimensions actually achieved to counter threats that actually materialize. The empirical results concentrate on determination of the technological advancement of a system and on investigation of the extent to which program performance flexibility is constrained by the acquisition strategy selected. Author

N72-27986*# National Academy of Public Administration, Washington, D.C.
TRANSFORMATION OF SCIENTISTS AND ENGINEERS INTO MANAGERS
James A. Bayton and Richard L. Chapman 1972 135 p refs
(Contract NSR-09-046-001)
(NASA-SP-291) Avail: NTIS; SOD $1.50 CSCL 05I

The purposes of this research were to determine the principal problems and obstacles faced by specialists during the transition period when they are becoming managers, and to discover ways by which their difficulties might be avoided or overcome. It was found that senior management officials are unaware--or tend to ignore the importance--of the transition process and its problems, that little attention has been given to developing management training to overcome transition problems, and that much of the training which is offered is largely irrelevant to these problems. Author

N72-27987# George Washington Univ., Washington, D.C. School of Government and Business Administration.
IMPROVING COST ESTIMATING AND ANALYSIS IN DOD AND NASA Ph.D. Thesis
Bruce N. Baker Jan. 1972 196 p refs Sponsored in part by the Army
(AD-738983) Avail: NTIS CSCL 05/1

The procurement research was based on the assumption that one of the principal keys to improving the process is understanding how original government cost estimates are produced. This is the point where fact and fiction must be separated in time to affect the decision-making process. The research questions were oriented to examine the current approaches, attitudes, and preferences of managers and practitioners of cost estimating and cost analysis within the Department of Defense (DOD) and the National Aeronautics and Space Administration (NASA). GRA

N72-28105# System Development Corp., Santa Monica, Calif.
HUMAN FACTORS IN THE DEVELOPMENT OF AIR TRAFFIC CONTROL AUTOMATION
John M. Daily 1 Apr. 1971 21 p Sponsored by FAA
Avail: NTIS HC $3.25

The importance of integrating personnel or human factor considerations into the process of developing automated air traffic control systems is discussed. It is shown that fundamental to effective system development is a well conceived system engineering plan that contains the human factor aspects of the system. Author

N72-28118# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON THE COMPLEX ORGANIZATION OF NEW WORK IN THE AERO ENGINEERING SERVICE (AES) OF THE AIR FORCE/AIR DEFENSE
H. Jaretzki 11 Dec. 1971 13 p Transl. into ENGLISH from Militaertechnik (East Ger.), no. 1, 1970 p 32-33
(AF Proj. 1368)
(AD-739217; FTD-HT-23-853-71) Avail: NTIS CSCL 05/9

The report states the necessity for leadership in the new innovations in the aviation engineering service of the Air Force/Air Defense Service. In addition, this concept is dealt with in considerable detail and particularly in the mass production of leaders, technical procedures in servicing and maintaining aircraft operational readiness, working conditions and materials, the analytical processes and the qualification of engineering technical personnel. In conclusion, the advantages that the application of this concept presents are briefly outlined.
Author (GRA)

N72-28196*# Information Research Associates, Inc., San Antonio, Tex.
RELIABILITY TECHNIQUES FOR COMPUTER EXECUTIVE PROGRAMS
17 May 1972 91 p refs
(Contract NAS8-2666-9)
(NASA-CR-123736) Avail: NTIS HC $6.75 CSCL 09B

Computer techniques for increasing the stability and reliability of executive and supervisory systems were studied. Program segmentation characteristics are discussed along with a validation system which is designed to retain the natural top down outlook in coding. An analysis of redundancy techniques and roll back procedures is included. F.O.S.

N72-28210# Naval Personnel and Training Research Lab., San Diego, Calif.
FEASIBILITY OF COMPUTER GENERATED DATA DISPLAYS IN THE AUTOMATED PERFORMANCE EVALUATION SYSTEM
David W. Robertson, Jim James, and Marjorie H. Royle Apr. 1972 31 p refs
(AD-740086; SRR-72-20) Avail: NTIS CSCL 09/2

A method for providing selection boards and detailers with a timely and accurate evaluation of individual on-job performance is essential if valid decisions are to be made in selecting individuals for advancement, duty-assignment, training or quality retention. Four formats and data sets are presented which demonstrate the feasibility and utility of computer-generated displays of performance evaluation data. Author (GRA)

N72-28476# Oak Ridge National Lab., Tenn.
QUALITY ASSURANCE PLAN FOR THE LARGE-SCALE PROCUREMENT OF TEMPERATURE SENSORS
M. B. Herskovitz 1 Mar. 1972 18 p refs Supersedes GF-71-12-37 Sponsored by AEC
(ORNL-TM-3740; GF-71-12-37) Avail: NTIS

A quality assurance program plan was prepared for large scale procurement of thermocouple bulk material and assemblies. This plan describes the functions and responsibilities of each participant, i.e., the seller, the user, and ORNL personnel in specifying, procuring, storing, assembling, testing, and shipping bulk materials, assemblies, and samples. This plan assures users that they will obtain thermocouples that meet the requirements specified by them. Author (NSA)

N72-28878*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
THE MANAGEMENT APPROACH TO THE NASA SPACE STATION DEFINITION STUDIES AT THE MANNED SPACECRAFT CENTER
Jack C. Heberlig Jun. 1972 61 p
(NASA-TM-X-58090; MSC-06750) Avail: NTIS HC $5.25 CSCL 22B

The overall management approach to the NASA Phase B definition studies for space stations, which were initiated in September 1969 and completed in July 1972, is reviewed with particular emphasis placed on the management approach used by the Manned Spacecraft Center. The internal working organizations of the Manned Spacecraft Center and its prime contractor, North American Rockwell, are delineated along with the interfacing techniques used for the joint Government and industry study. Working interfaces with other NASA centers, industry, and Government agencies are briefly highlighted. The controlling documentation for the study (such as guidelines and constraints, bibliography, and key personnel) is reviewed. The historical background and content of the experiment program prepared for use in this Phase B study are outlined and management concepts that may be considered for future programs are proposed. Author

N72-28934*# Southeastern State Coll., Durant, Okla. Technology Use Studies Center.
TECHNOLOGY UTILIZATION IN A NON-URBAN REGION: FURTHER IMPACT AND TECHNIQUE OF THE TECHNOLOGY USE STUDIES CENTER (3) Final Report
C. Henry Gold, A. M. Moore, Bill Dodd, comp., and Velma Dittmar, comp. May 1972 75 p refs
(Contract NSR-37-004-009)
(NASA-CR-127437; AR-8) Avail: NTIS HC $5.75 CSCL 05B

The activities of the Technology Utilization Center are reported. Data concerning the searches, and the types of firms requesting information are presented along with the dissemination and assistance by TUSC. F.O.S.

N72-28935*# North Carolina Science and Technology Research Center, Durham.
REGIONAL TECHNOLOGY TRANSFER PROGRAM Final

Report, 1 Nov. 1970 - 31 Oct. 1971
31 Oct. 1971 70 p
(Contract NASw-2051)
(NASA-CR-124825) Avail: NTIS HC $5.50 CSCL 05B

The continuing operation is reported of a jointly state- and NASA-sponsored Regional Dissemination Center serving the southeastern United States. The NC/STRC offers automated searching of large information collections, such as that assembled by NASA, with emphasis on textile-related files to serve regional industry. During this period, NC/STRC conducted an in-depth analysis of its marketing programs and prepared a series of brochures aimed at various segments of industry. Heavy emphasis was also placed on the Library Search Service inaugurated by NC/STRC, and a total of 32 universities now participate in this service. Smaller schools are served through the university network. Although the nationwide industrial recession caused a general drop in search requests, NC/STRC processed a total of 838 retrospective searches during this period: 39.97% for its industrial clients, 22.9% for university libraries, and 37.1% for other RDC's. Author

N72-28939# Nauka Press, Leningrad (USSR).
ADMINISTRATIVE ORGANIZATION OF SCIENTIFIC RESEARCH [ORGANIZATSIYA UPRAVLENIYA NAUCHNYMI ISSLEDOVANIYAMI]
K. A. Lange 1971 149 p refs In RUSSIAN
Avail: NTIS HC $9.50

Certain problems of contemporary organizational control of scientific investigations are considered. A possible variant for creating a control system for scientific experiments is presented, consisting of prediction nodes, planning, management, coordination, and control. Questions of the role of scientific information in the control system are discussed and the significance of meetings for the control of scientific experiment in general is reviewed. The modern organization of scientific collectives and the activity of scientific unions in the Soviet Academy of Sciences as collective organs of scientific control are analyzed. Transl. by K.P.D.

N72-28965 Smithsonian Institution, Washington, D.C.
ROBERT H. GODDARD AND THE JAMES-SMITHSON FOUNDATION (SMITHSONIAN INSTITUTION) [ROBERT H. GODDARD UND DIE JAMES-SMITHSON STIFTUNG (SMITHSONIAN INSTITUTION)]
F. C. Durant *In* DGLR Report on the DGLR-Symp. Pioneers of Space Flight Sep. 1971 p 40-50 refs In GERMAN

Details of the 29-year long cooperation between the Smithsonian Institution and the physicist Goddard are discussed. The financial support of the Institution in the development of an upper atmosphere rocket for aerial photography as well as for long range rocket propulsion systems is outlined. Transl. by G.G.

N72-28972*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
PROCUREMENT SPECIFICATIONS REPORT. IMBLS PHASE B-4
9 Dec. 1970 100 p
(Contract NAS9-10742)
(NASA-CR-115720; LMSC-A977461) Avail: NTIS HC $7.00 CSCL 05C

Procurement specifications to provide vendors of space systems with supporting information to accurately price the selected major buy items are illustrated. In performing this task, rigid constraints on specifications and drawing details are avoided beyond those necessary to define basic requirements. Described are digital processing equipment, mass spectrometer, body mass measuring device, sensors, bio-belt power source, vision tester and instrumentation for a biochemical station. G.G.

N72-28974# National Bureau of Standards, Washington, D.C. Office of International Relations.
NBS SPECIAL FOREIGN CURRENCY PROGRAM IN ISRAEL, 1970 - 1971
H. Steffen Peiser and Max Klein Apr. 1972 179 p refs
(NBS-TN-721) Avail: SOD $1.50 as C13.46:721

Summaries of research performed under grants awarded by NBS are presented in a form useful for evaluating the binational cooperative scientific program. The projects reported are geared mainly toward improved scientific and technical measurements and more effective use of science and technology. Calibrating techniques, development of standards, measurements on materials, materials science, building technology, computerized data processing, and information reference services are covered. N.E.N.

N72-28979# Department of Transportation, Washington, D.C.
COMMUTER AIR CARRIERS
May 1972 75 p
Avail: NTIS HC $5.75

The usefulness and importance of commuter air carriers are discussed; it was found that 80 percent of their passengers connect with major airlines. Commuter carriers operate successfully without Federal requlation of rates and routes and Federal subsidies. The utilization of higher capacity aircraft for commuter service is being considered by the Civil Aeronautics Board. The commuter airline industry's history, Federal policies and programs, and regulatory problems are also presented. J.A.M.

N72-28987*# National Aeronautics and Space Administration, Washington, D.C.
NASA WORK UNIT SYSTEM FILE MAINTENANCE MANUAL
Aug. 1972 51 p
(NASA-TM-X-2608) Avail: NTIS HC $3.00 CSCL 05B

The NASA Work Unit System is a management information system for research tasks (i.e., work units) performed under NASA grants and contracts. It supplies profiles on research efforts and statistics on fund distribution. The file maintenance operator can add, delete and change records at a remote terminal or can submit punched cards to the computer room for batch update. The system is designed for file maintenance by a person with little or no knowledge of data processing techniques. Author

N72-28988*# National Aeronautics and Space Administration, Washington, D.C.
NASA WORK UNIT SYSTEM USERS MANUAL
Aug. 1972 62 p
(NASA-TM-X-2609) Avail: NTIS HC $3.00 CSCL 05A

The NASA Work Unit System is a management information system for research tasks (i.e., work units) performed under NASA grants and contracts. It supplies profiles to indicate how much effort is being expended to what types of research, where the effort is being expended, and how funds are being distributed. The user obtains information by entering requests on the keyboard of a time-sharing terminal. Responses are received as video displays or typed messages at the terminal, or as lists printed in the computer room for subsequent delivery by messenger. Author

N72-29015# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A MAINTENANCE MANHOUR SENSITIVITY MODEL FOR CARGO AIRCRAFT M.S. Thesis
Terry R. Little Mar. 1972 124 p refs

(AD-741410; GSA/SM/72-9) Avail: NTIS CSCL 15/5

A statistical study, based on one year's historical data, was made on the effects of certain policy changes on both cargo aircraft maintenance manhours and aircraft out-of-commission time. The results indicated that manhours were highly sensitive to flying hours, but not in constant proportion as implied in the generally used term, manhours/flying hour. Sortie length and number of landings per sortie have no apparent effects on manhours, judging from the sample data. It was further discovered that manhour changes may be expected if an aircraft is deployed either to Pacific Air Forces or Reserve/Guard units. Further manhours were found to be highly correlated with aircraft complexity as primarily measured by aircraft empty weight. Author (GRA)

N72-29024# Army Agency for Aviation Safety, Fort Rucker, Ala.

PREPARATION OF A SYSTEM SAFETY PROGRAM PLAN FOR AVIATION SYSTEMS DEVELOPMENT Final Report

Mar. 1972 36 p ref

(AD-741364; USAAAVS-TR-72-8) Avail: NTIS CSCL 13/12

As an essential part of the Army aviation accident prevention program, System Safety is dedicated to before the fact: elimination of hazards from aircraft systems by the application of management, science, and technology principles. Army attempts to apply the provisions of MIL-STD-882 in aircraft development programs indicates a significant gap between requirements at *the standard and a practical safety program. The purpose of the* report is to identify specific areas of concern which lie between the philosophical and the practical applications of system safety. GRA

N72-29975*# Grumman Aerospace Corp., Bethpage, N.Y.

PROGRAM MANAGEMENT AID FOR REDUNDANCY SELECTION AND OPERATIONAL GUIDELINES Final Report

P. W. Hodge, W. L. Davis, and B. Frumkin Jan. 1972 108 p ref

(Contract NAS10-7697)

(NASA-CR-128494) Avail: NTIS HC $7.50 CSCL 05A

Although this criterion was developed specifically for use on the shuttle program, it has application to many other multi-missions programs (i.e. aircraft or mechanisms). The methodology employed is directly applicable even if the tools (nomographs and equations) are for mission peculiar cases. The redundancy selection criterion was developed to insure that both the design and operational cost impacts (life cycle costs) were considered in the selection of the quantity of operational redundancy. These tools were developed as aids in expediting the decision process and not intended as the automatic decision maker. This approach to redundancy selection is unique in that it enables a pseudo systems analysis to be performed on an equipment basis without waiting for all designs to be hardened. Author

N72-29979*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

GENERAL METHODOLOGY: COSTING, BUDGETING, AND TECHNIQUES FOR BENEFIT-COST AND COST-EFFECTIVENESS ANALYSIS

D. Michael Stretchberry and Gerald F. Hein Washington Aug. 1972 20 p refs

(NASA-TM-X-2614; E-6906) Avail: NTIS HC $3.00 CSCL 05A

The general concepts of costing, budgeting, and benefit-cost ratio and cost-effectiveness analysis are discussed. The three common methods of costing are presented. Budgeting distributions are discussed. The use of discounting procedures is outlined. The benefit-cost ratio and cost-effectiveness analysis is defined and their current application to NASA planning is pointed out. Specific practices and techniques are discussed, and actual costing and budgeting procedures are outlined. The recommended method of calculating benefit-cost ratios is described. A standardized method of cost-effectiveness analysis and long-range planning are also discussed. Author

N72-29982# Civil Aeronautics Board, Washington, D.C.

REMARKS BY SECOR D. BROWNE, CHAIRMAN, CIVIL AERONAUTICS BOARD, BEFORE THE ECONOMICAL *CLUB OF DETROIT, DETROIT, MICHIGAN*

Secor D. Browne 17 Jan. 1972 6 p

Avail: NTIS HC $3.00

Data covering the future of the airline industry in production transport aircraft are presented. It was suggested that the industry's problems are caused by financial problems and the Government's refusal to give assistance. E.H.W.

N72-29983# *Civil Aeronautics Board, Washington, D.C.*

REMARKS BY SECOR D. BROWNE, CHAIRMAN, CIVIL AERONAUTICS BOARD, BEFORE THE DOWNTOWN ROTARY CLUB AND THE GREATER TAMPA CHAMBER OF COMMERCE, TAMPA, FLORIDA

Secor D. Browne 1 Feb. 1972 10 p

Avail: NTIS HC $3.00

The financial condition of the airline industry is discussed as well as its problems in producing new aircraft. Special attention is given to the decline of transport aircraft production, and *government aid to the industry.* E.H.W.

N72-29989# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

A DUAL INDUSTRY ANALYSIS TO GIVE PERSPECTIVE TO AEROSPACE DEFENSE INDUSTRY PROFITS M.S. Thesis

Michael J. Mruz Mar. 1972 122 p refs

(AD-741411; GSA/SM/72-11) Avail: NTIS CSCL 05/3

The study examines the aggregate profit rates of various samples of aerospace defense contractors within the particular operating environment of the defense and space systems market. To give perspective to this particular operating environment, a parallel study of the public utility industry and its operating environment is also included. The analysis includes a detailed examination of return indices for both industries and a comprehensive description of the particular industry operating environments. The elements of the operating environments studies are capital investment, research and development, demand, competition, and regulation and contracts. GRA

N72-30431# Joint Publications Research Service, Arlington, Va.

THE AUTOMATED INDUSTRY OF CONTROL

D. Zhimerin 1 Aug. 1972 17 p Transl. into ENGLISH from Nauka i Zhizn. (Moscow), no. 6, 1972 16 p

(JPRS-56651) Avail: NTIS HC $3.00

The control of economic and social processes by a nationwide automated system to collect and process information for accounting, planning, and controlling the national economy of the U.S.S.R. is discussed. The system is built on the basis of a state system of computer centers and the unified automatic communications network. Author

N72-30972# RAND Corp., Santa Monica, Calif.

INCREASING THE EFFECTIVE USE OF ANALYSIS THROUGH PROGRAM-ORIENTED MANAGEMENT

Sue A. Haggart Apr. 1972 12 p refs Presented at Ann. Meeting of the Am. Educational Res. Assoc., Chicago, 3-7 Apr. 1972

(P-4814) Avail: NTIS HC $3.00

Some of the problems analysis has encountered in solving equal educational opportunity situations are discussed. The

N72-32984# World Airways, Inc., Oakland, Calif.
MINIMUM TRANSPORTATION REGULATION MAXIMIZES TOURISM'S CONTRIBUTION TO ECONOMIC GROWTH
Howell M. Estes, Jr. [1972] 17 p refs Presented at 1st World Congr. on Air Transp. and Tourism, Madrid, 17-21 Apr., 1972
Avail: NTIS HC $3.00

The effect of minimum transportation regulation on the contribution of tourism to economic growth is discussed. It is concluded that tourism has assumed major stature as a world economic force and that the future of airlines is closely tied to the development of tourism. It is also concluded that tourism can achieve its full growth potential only in a policy framework that permits the highest level of freedom to all elements in the tourism picture. Author

N72-33040# American Airlines, Inc., New York.
AIRLINE VIEW OF STOL SYSTEM REQUIREMENTS Final Report
Feb. 1972 22 p refs
(AD-745283; AAL-ER/D-56-Summary; DOT-OS-10075-Summary) Avail: NTIS CSCL 01/3

Conventional air and rail systems are incapable of providing needed short-haul service for the increased capacity requirements of the near future. Some improvements can be made but a new, integrated short-haul transportation system may be needed to supplement the present system. The complexity and magnitude of the problem require significant leadership and funding by the Federal Government. The airlines' areas of concern include the aircraft, STOLports, ATC, marketing, safety, economics, and acceptance by passengers and STOLport neighbors. The paper addresses reduced takeoff and landing (RTOL), propeller STOL transport (PST), jet STOL transport (JST), ATC, STOLport siting, route analysis, certification and safety, airline service requirements, economics, Metroflight demonstration need, STOLport acceptance, public demand stimulation and STOL development system management. Its purpose is to document an airline's views on as many STOL system implementation factors as possible at this time to provide for STOL system planners. Author (GRA)

N72-33152# System Development Corp., Santa Monica, Calif.
REPORT OF THE CACTOS PROJECT: A PRELIMINARY INVESTIGATION OF COMPUTATION AND COMMUNICATION TRADE-OFFS IN MILITARY COMMAND AND CONTROL SYSTEMS
Norman E. Willmorth 1 Apr. 1972 149 p refs Supersedes SDC-TM-4743/012/00
(Contract DAHC15-67-C-0149; ARPA Order 1327; ARPA Proj. 2D30)
(AD-744670; SDC-TM-4743/012/01; SDC-TM-4743/012/00) Avail: NTIS CSCL 17/2

The progress of the Computation and Communication Trade-Off Study (CACTOS), conducted for the Advanced Research Projects Agency, for the purpose of determining the cost effectivity of new computer hardware, software, and communication channels for future Department of Defense requirements is reported. Efforts to conceptualize DoD information processing needs and to develop analytic models and programs are reported. Technological alternatives are examined. A network analysis model is described. Author (GRA)

N72-33171 National Lending Library for Science and Technology, Boston Spa (England).
UNIPEDE DATA PROCESSING SYMPOSIUM: SUMMARY OF REPORTS
7 Jun. 1972 44 p refs Transl. into ENGLISH from "L'Economie Electrique, no. 63"' France, Aug. 1971. Mostly in ENGLISH; partly in FRENCH Symp. held in Lisbon, Jun. 1971
(NLL-OA-Trans-696-(6196.3)) Avail: Natl. Lending Library, Boston Spa, Engl.: 4 NLL photocopy coupons

Automatic treatment of billing, consumer management, telemanagement, prospects for data processing in the electricity fields, and applications to accounting, personnel management, and stocks are discussed. On-line computer applications are considered, along with off-line computer applications and information distribution. Programming languages, software, organization problems, and techniques of collection and presentation of information are also included. J.A.M.

N72-33675# Environmental Protection Agency, Washington, D.C.
STATE AND MUNICIPAL NONOCCUPATIONAL NOISE PROGRAMS Final Report
31 Dec. 1971 39 p refs
(PB-208659; EPA-NTID300.8) Avail: NTIS HC $3.00 CSCL 13B

A report is presented on state and municipal government nonoccupational noise abatement and control programs prepared from information obtained in response to a questionnaire disseminated by the Environmental Protection Agency (EPA). They were forward by the EPA Administrator to the governors of each state (including Guam, Puerto Rico, the Virgin Islands) and the mayors of the 153 cities having populations, as of 1970, of 100,000 or more. The questionnaire requested information concerning the level and scope of existing and planned noise abatement and control programs. It furthermore solicited opinions on what additional support programs could be developed by the Federal government. Author (GRA)

N72-33972# Federal Aviation Administration, Washington, D.C. Office of Management Systems.
TOWARD DEVELOPING AN IMPROVED CENTRAL FLOW MANAGEMENT SYSTEM
Richard Hakkarinen Oct. 1971 268 p
Avail: NTIS HC $15.50

The development and operation of a Central Flow Control Facility (CFCF) for balancing national aircraft flow in order to minimize delays to the users without exceeding controller capacity or jeopardizing safety are discussed. The concepts of flow management are presented in terms of: (1) scope, (2) purpose, (3) objectives of flow management system, and (4) concerns of flow management system. The Central Flow Computer Model for computer-based forecasting to provide status information on sectors or routes for any time period throughout the day of any day of the week is described. Author

N72-33974# Committee on Science and Astronautics (U. S. House).
SCIENCE, TECHNOLOGY, AND THE ECONOMY
Washington GPO 1972 205 p refs Hearings before Comm. on Sci. and Astronaut., 92d Congr., 2d Sess., no. 28, 11-13, 18, and 20 Apr. 1972
Avail: Subcomm. on Sci., Res., and Develop.

The hearings concerning the relation of science and technology to economic growth and prosperity are reported. Charts showing the structural changes in U.S. trade for selected years from 1969 to 1971, and comparative growth output per man hour in manufacturing for the U.S. and other industrialized nations are included. Discussions of the use of technology for solving social problems, government R and D, and R and D in the private sector are presented. F.O.S.

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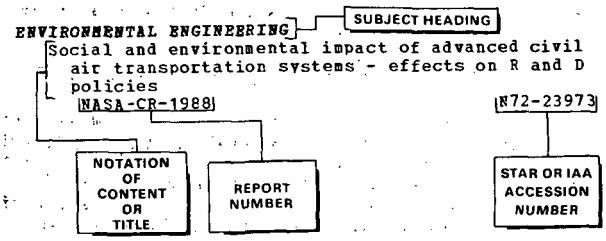
Typical Subject Index Listing



A Notation of Content (NOC), rather than the title of the document, usually appears under each subject heading; it is listed under several headings to provide multiple access to the subject content. (AIAA occasionally uses the title in lieu of the NOC.) The *STAR* and *IAA* accession number is located beneath and to the right of the Notation of Content, e.g., N72-23973. Under any one subject heading, these accession numbers are listed in ascending order in each series.

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Northrop A-9A attack aircraft production planning, discussing design features and management/engineering organizational changes in anticipation of USAF production contract
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Industrial parachute R and D in UK, discussing management, technical staff requirements and government/industry liaison
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Space shuttle program evaluation, discussing national economic benefits relative to aerospace industry employment, domestic production, balance of trade, etc
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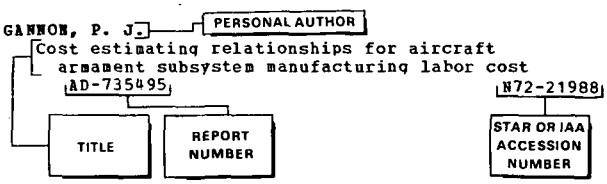

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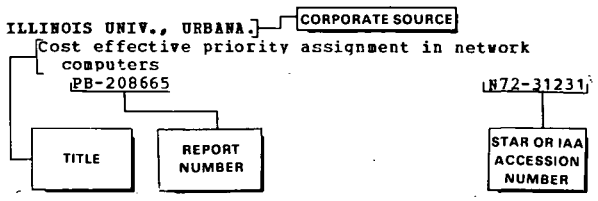

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Reliability programming: A selective bibliography, 1960 October 1971
[CE-BIB-2] N72-18478
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[CE-BIB-221] N72-26402

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15. Supplementary Notes

16. Abstract

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